CCME

Canadian Council of Ministers of the Environment

Le Conseil canadien des ministres de l'environnement

ENVIRONMENTAL CODE OF PRACTICE FOR VAPOUR RECOVERY IN GASOLINE DISTRIBUTION NETWORKS

MARCH 1991
CCME-EPC/TRE-30E

This publication is printed on paper containing recovered waste.

ENVIRONMENTAL CODE OF PRACTICE

FOR VAPOUR RECOVERY IN GASOLINE DISTRIBUTION NETWORKS

Prepared by the
National Task Force on
Vapour Recovery in
Gasoline Distribution
Networks

Published by
The Canadian Council of Ministers
of the Environment
March 1991

93-00244/

CCME

Canadian Council of Ministers of the Environment

Le Conseil canadien des ministres de l'environnement

The Canadian Council of Ministers of the Environment (CCME) is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. Environment ministers from each of the ten provinces, the federal government, and the two territories participate in council meetings at least twice a year. They discuss environmental issues, exchange information, make decisions and establish policy for work to be carried out under the auspices of CCME.

The presidency of CCME and other official posts are rotated annually among member governments.

Early in 1990 CCME began a major restructuring in order to more effectively address the large number of important environmental issues facing the country. A new, streamlined organization enables member governments to respond quickly to emerging issues, set national environmental strategies and develop long-term plans.

Between meetings of the Council of Ministers, the work of CCME is managed by a Deputy Ministers Committee and a full-time Secretariat. The Secretariat, in Winnipeg, Manitoba, provides administrative, technical and policy support to the Council of Ministers and various CCME committees. Two permanent intergovernmental steering committees provide ongoing advice to the Deputy Ministers Committee and coordinate specific CCME projects assigned to intergovernmental task groups.

Edition March 1991
ISBN 0-919074-66-9
CCME-EPC/TRE-30E

Ce document est également publié en français.

ENVIRONMENTAL CODE OF PRACTICE
FOR
VAPOUR RECOVERY IN
GASOLINE DISTRIBUTION NETWORKS

Abstract

The CCME Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks has been prepared for the gasoline distribution and marketing industry, and for authorities having jurisdiction, as an initiative of the NOx/VOC Management Plan. In this document, environmental considerations have been developed for the control of gasoline vapour emissions in distribution networks. Practices are included for the application, performance, testing for compliance, record keeping, and operation of the required equipment. These practices are intended to reduce the contribution of vapours from gasoline distribution systems to the total of volatile organic compound emissions in the atmosphere. The Code has been prepared by a federal/provincial/regional government-industry-environment group task force, and is intended as an environmental standard for governments, industry and the public

Table of Contents

		Page
List of Figures		v
Glossary of Terms		vi
Abbreviations		xi
Preface		xii
Introduction		xv
Part 1	**Description of Gasoline Distribution Networks and Vapour Control Systems**	1
SECTION 1.1	Description of Stage I Controls	
SECTION 1.2	Description of Stage II Controls	
SECTION 1.3	Statistics on Gasoline Distribution Networks	
SECTION 1.4	Equipment Standard	
Part 2	**Application of Vapour Control Systems**	3
SECTION 2.1	Background	
SECTION 2.2	Application Areas and Timing	
SECTION 2.3	Other Considerations	
Part 3	**Vapour Control Systems for Terminals**	6
SECTION 3.1	Application Guide	
SECTION 3.2	Equipment Standards	
SECTION 3.3	Performance Criteria	
SECTION 3.4	Record Keeping	
SECTION 3.5	Compliance	
SECTION 3.6	Training	
SECTION 3.7	Operating Practices	
Part 4	**Vapour Control Systems for Bulk Plants**	11
SECTION 4.1	Application Guide	
SECTION 4.2	Equipment Standards	
SECTION 4.3	Performance Criteria	
SECTION 4.4	Record Keeping	
SECTION 4.5	Compliance	
SECTION 4.6	Training	
SECTION 4.7	Operating Practices	

Part 5	**Vapour Control Systems for Service Stations**	15
SECTION 5.1	Application Guide	
SECTION 5.2	Equipment Standards	
SECTION 5.3	Performance Criteria	
SECTION 5.4	Record Keeping	
SECTION 5.5	Compliance	
SECTION 5.6	Training	
SECTION 5.7	Operating Practices	
Part 6	**Vapour Control Systems for Cargo Tank Trucks**	19
SECTION 6.1	Application Guide	
SECTION 6.2	Equipment Standards	
SECTION 6.3	Performance Criteria	
SECTION 6.4	Record Keeping	
SECTION 6.5	Compliance	
SECTION 6.6	Training	
SECTION 6.7	Operating Practices	
Part 7	**Vapour Control Systems for Ships and Barges**	23
SECTION 7.1	Application of Code	
Part 8	**Vapour Control Systems for Marinas**	24
SECTION 8.1	Application Guide	
SECTION 8.2	Equipment Standard	
Part 9	**Vapour Recovery for Rail Car Systems**	25
SECTION 9.1	Application Guide	
Part 10	**Aviation Gasoline Facilities**	26
SECTION 10.1	Application Guide	
APPENDICES		
Appendix A	**List of Task Force Members** **Non-Member Participants**	27
Appendix B	**Figures**	29
Appendix C	**Explanatory Notes**	42
Appendix D	**Provisions for Stage II Application** **Onboard Canisters vs Fueling Nozzles**	43

Appendix E	**Summary of Code Requirements**	**44**
Appendix F	**Sample Record Keeping Form**	**49**

List of Figures

Figure 1	Gasoline Distribution Network Without Vapour Recovery
Figure 2	Gasoline Distribution Network With Vapour Control Systems (VCS)
Figure 3	VOC Emissions in Canada - Contribution from Gasoline Distibution
Figure 4	Lower Fraser Valley Region, British Columbia
Figure 5	Windsor-Quebec City Corridor Region
Figure 6	Cargo Tank Top Loading
Figure 7	Cargo Tank Bottom Loading
Figure 8	Terminal Vapour Control Connections
Figure 9	Bulk Plant Vapour Control Connections
Figure 10	Dual Point Vapour Balance Connections
Figure 11	Coaxial Vapour Balance Connections
Figure 12	Cargo Tank Vapour Control System

Glossary of Terms

Words and phrases that are not included in the list of defined terms in this part shall have the meanings that are commonly assigned to them in the context in which they are used in this Code.

The following words and terms used in the Code shall have the indicated meaning:

Appropriate provisions -- the considerations required to ensure that a vapour control system can be readily retrofitted at a later date.

Authority Having Jurisdiction -- an officer or officers having authority, under appropriate regulatory instruments, to exercise enforcement functions or powers.

Bottom Loading -- a system for loading liquid petroleum products into a cargo tank truck from the bottom, through a system of pipes, valves and dry-disconnect fittings(Figure 7). See also "Submerged fill".

Bulk Storage Facility -- one or more storage tanks, including the appurtenances thereof, where gasoline or an associated product is received by pipeline, cargo tank truck, barge or rail car, and is stored in bulk for subsequent transportation or distribution by cargo tank truck.

There are two types of bulk storage facilities:

a. **Terminal** -- a primary distribution facility normally equipped with floating roof tanks that receives gasoline by pipeline, rail car or marine transfer; and,

b. **Bulk Plant** -- a secondary distribution facility normally equipped with fixed roof tanks, and sometimes underground tanks, that normally receives gasoline by cargo tank trucks.

Cargo Tank (Truck), Highway Tank, Tanker or Tank Truck -- a trailer having a compartmented tank on it; or a motor vehicle having a compartmented tank mounted on the frame or chassis of the vehicle, used for transporting gasoline and other liquid petroleum products in bulk at ambient temperatures.

Coaxial Vapour Recovery System -- a system for collecting vapours, during the delivery of gasoline to an underground storage tank, which uses a single coaxial tank connection for both filling and vapour collection purposes (Figure 11).

Combustible Gas Detector -- an instrument used to detect explosive mixtures in the air.

Compliance -- conformance with the terms of legislation and other regulatory instruments developed and promulgated by the authority having jurisdiction.

Distribution Network -- the various parts which make up the distribution system which takes gasoline from a refinery to the service station dispenser or fueling point (Figure 1). For the purpose of the Code, distribution network refers to that part of the system from the outlet of the terminal tank, up to and including the storage tank at a service station.

Drop Tube -- a length of tubing which extends from the top filling connection to within 100-150 millimetres of the bottom of the cargo (or underground storage) tank. Its use permits submerged filling.

Dual Point Vapour Recovery System -- a system for collecting vapours, during the delivery of gasoline to a service station underground storage tank, by a tank connection other than the fill connection.

Efficiency -- the ratio of vapours recovered or captured to total vapour emissions.

Expanded Facility -- any change to existing facilities or equipment which increases the annual throughput.

Facility -- the buildings, equipment, structures and other stationary items which are located on a site that is associated with the distribution of gasoline.

Fixed Roof Tank -- a tank with a fixed roof, but with no internal floating roof or other internal vapour emission controls (e.g., bladder). A fixed roof tank is normally equipped with a Pressure/Vacuum vent (PV vent) and can be vapour balanced.

Floating Roof Tank -- a tank normally used in terminal operations which is equipped with a floating "pan" roof cover. This floats on top of the gasoline, and is equipped with seals to the sidewall to minimize vapour loss; the air space above a floating roof is vented to atmosphere. The tank may also have a fixed roof (i.e., an internal floating roof tank). A floating roof tank normally cannot be vapour balanced.

Gasoline -- a petroleum distillate and/or a mixture of petroleum distillates and oxygenates used as a fuel in spark ignition engines.

Two types of gasolines are of special interest:

a. **Automotive Gasoline** -- gasoline intended for use in automotive internal combustion engine and having a Reid Vapour Pressure (RVP) greater than 48 kPa (7 psi); and,

b. **Aviation Gasoline** -- gasoline intended for use in aviation spark ignition engines and having a Reid Vapour Pressure (RVP) less than 48 kPa (7 psi).

Hydrocarbon -- compounds of carbon and hydrogen which constitute the main component of petroleum products.

Interlock -- a mechanical or electrical device by means of which the functioning of one part of a system is controlled by the functioning of another.

Leak Free -- connections which when assembled and in continuous normal service maintain a leak rate:

a. **For Liquid Loading** -- not exceeding 4 drops per minute excluding losses which occur upon disconnect. Upon disconnection, transfer losses shall not exceed 10 millilitres per dry-disconnect of the same fitting, averaged over 3 disconnects; or,

b. **For Vapour** -- of less than 100% of the lower explosivity limit, measured by a combustible gas detector at a distance of 25 millimetres from the source.

Leak Test -- a standardized test, defined in CAN/CGSB-3.1000-M, to determine the vapour or liquid leakage rate of equipment, connections or systems.

Lower Explosivity Limit (LEL) -- the concentration of flammable gases or vapours in air, above which the mixture is explosive.

Manifold -- a pipe connecting several inlets to a common outlet.

Marina -- a gasoline fueling point which services water craft.

Onboard Canister -- a container filled with an adsorbent (e.g., activated carbon) which collects gasoline vapours in a motor vehicle.

Operating Procedure -- the written guidelines and recommendations associated with equipment, which enable the person operating a facility to run it according to accepted practices, recommended equipment procedures and regulations.

Operating Service Factor -- the ratio of hours (during facility operation) that a vapour control system is operating normally (tn) to the total operating hours of the facility (ts), calculated over a calendar year;

Operating Service Factor % = tn /ts x 100

Operator -- the following two definitions are used:

a. When referring to a facility, the person who is responsible for the day-to-day operation of a terminal, bulk plant or service station, and is normally on the premises during the hours of operation; and,

b. When referring to a cargo tank truck, the driver in charge of the cargo tank truck.

Owner -- an institution, corporate entity, government agency or a person who has legal ownership rights, or who has been assigned the custody to control, care for and manage a terminal, bulk plant, service station or cargo tank truck.

Ozone -- an irritating gas which has the triatomic form of oxygen (O3)

Permissive System -- a system of mechanical or electrical interlocking devices that prohibit the loading or unloading of gasoline unless the vapour recovery system is properly connected.

Poppet -- a spring loaded disk mounted in an adapter or coupler which provides positive closure when the adapter or coupler is disconnected.

Poppetted Fitting -- a fitting equipped with a poppet for system closure when disconnected.

PV Vent -- a pressure-vacuum vent designed to allow relatively small pressure increases or decreases to occur within a tank, without allowing vapour venting to the atmosphere or air in-breathing into the tank.

Random Leak Test -- a leak test which can be taken at any time during the loading of a cargo tank.

Reid Vapour Pressure -- the vapour pressure of gasoline or an associated product as defined in CAN/CGSB-3.1000-M.

Service Station -- any premises at which gasoline is dispensed into the fuel tanks of motor vehicles, including marinas with land-based storage.

Stage I Controls -- the equipment used to recover gasoline vapours at terminals, bulk plants, and from service stations. (Figure 2)

Stage II Controls -- the equipment used to recover gasoline vapours emitted during motor vehicle refueling, at a service station. (Figure 2)

Submerged Fill -- a system for loading liquid petroleum products into any tank by means of a pipe to provide entry below the liquid surface, thereby minimizing splash and vapour formation. (Figures 2, 6, 10)

Switch Loading -- alternate loading of gasoline and other liquid petroleum products in the same compartment of a cargo tank, without purging the previous material.

Thermal Oxidation Unit -- an installation, normally located at a terminal, which receives gasoline vapours from cargo tank trucks and oxidizes the vapours through combustion.

Throughput (débit) -- the total volume of gasoline distributed through a facility per unit of time.

Top Loading -- the loading of liquid petroleum products into cargo tank trucks from the top, either through dome hatches using swivel arms and drop tubes, or top tight fill connections. (Figure 6)

Top Tight Fill [Connections] -- top loading equipment composed of a dry-disconnect adapter with a submerged fill tube, fixed to the cargo tank truck. (Figure 6)

Underground Storage Tank -- a storage tank that is completely buried by or covered with earth, backfill or concrete, or a partially buried tank. A partially buried tank means a storage tank that has 10% or more of its volume below adjacent ground level.

Vapour Control System (VCS) (Figure 2) -- a vapour retrieval system incorporating:

a. **Vapour Balancing** -- where vapours displaced from tanks receiving gasoline are returned to tanks delivering the gasoline;

b. **Vapour Recovery** -- where vapours returned from service stations and bulk plants, in cargo tank trucks, are recovered in a Vapour Recovery Unit (VRU) for subsequent use; or,

c. **Vapour Destruction** -- where vapours, returned from service stations and bulk plants in cargo tank trucks, are thermally destroyed in a VDU.

Vapour Destruction Unit (VDU) -- an installation, normally located at a terminal, which receives gasoline vapours from cargo tank trucks and destroys them by thermal oxidation or other means.

Vapour Recovery Unit (VRU) -- an installation, normally located at a terminal, which receives gasoline vapours from cargo tanks and recovers them for subsequent use.

Vapour Tight -- the ability of the various elements that comprise the vapour control system to prevent the emission of vapours to the atmosphere. For cargo tanks, this refers to the test specified in CAN/CGSB-3.1000-M.

Vent -- an opening, to the atmosphere, from the vapour space of a storage tank or cargo tank.

Volatile Organic Compounds (VOCs) -- compounds composed of hydrocarbons and other organic chemicals that evaporate to the atmosphere under ambient conditions. VOCs are also known as Reactive Organic Gases (ROGs) or Non-methane Volatile Organic Compounds (N-MVOCs). VOCs refer only to photochemically reactive hydrocarbons and therefore exclude compounds such as methane, ethane and several chlorinated organics.

Abbreviations

The abbreviations used in this Environmental Code for the names of associations, government agencies or other abbreviated words shall have the meanings assigned to them in this section.

CCME	Canadian Council of Ministers of the Environment
CGSB	Canadian General Standards Board
CPPI	Canadian Petroleum Products Institute
L	Litres
LFV	Lower Fraser Valley of British Columbia
M	Million
mg	Milligram
NOx	Nitrogen Oxides
PV	Pressure and Vacuum
RVP	Reid Vapour Pressure
SF	Submerged Fill
US EPA	United States Environmental Protection Agency
VB	Vapour Balancing
VCS	Vapour Control System
VOC(s)	Volatile Organic Compound(s)
VR	Vapour Recovery
VRU	Vapour Recovery Unit
VDU	Vapour Destruction Unit
WQC	Windsor-Quebec City Corridor

Preface

The Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks is published by the Canadian Council of the Ministers of the Environment (CCME). The Code was developed by a National Task Force, in accordance with directions provided by the CCME.

Gasoline contains Volatile Organic Compounds (VOCs), such as butane, pentane, benzene, toluene, and xylene. In combination with Nitrogen Oxides (NOx), reactive VOCs may promote the formation of ozone in the presence of sunlight on warm days, a process which takes place by means of photochemical reactions in the atmosphere. Ground level ozone contributes to "photochemical smog" and is of health and environmental concern. Gasoline vapours also contain compounds that are considered toxic.

Implementation of gasoline vapour recovery in distribution networks could result in a reduction of 2-3% of total anthropogenic (human activity) VOC emissions in Canada.

Control of gasoline vapour emissions throughout the distribution process - from terminals and bulk plants through delivery to service stations - is referred to as "Stage I vapour controls". These are distinct from Stage II vapour controls, which deal with the control of gasoline vapour emissions from vehicle refueling at service stations.

In October 1988, the CCME directed that a Management Plan for NOx and VOCs be developed for Canada. In October 1989, the Ministers made a commitment to the implementation of Stage I vapour controls in areas experiencing high ozone concentrations. The NOx/VOC Management Plan, approved by the CCME in November 1990, re-affirmed the commitment to control vapours from gasoline distribution and marketing networks, and outlined the general criteria for implementing such systems.

The NOx/VOC Management Plan contained two basic requirements for the implementation of Stage I vapour controls:

1) Full implementation of Stage I in two specific ozone non-attainment areas identified as the Lower Fraser Valley(LFV) and the Windsor-Quebec City Corridor(WQC);

2) Provisions for Stage I vapour controls at all new terminals, bulk plants, and service stations built elsewhere in Canada.

After the October 1989 announcement by the CCME and during the preparation of the NOx/VOC Management Plan, a National Task Force was formed to develop an environmental code of practice to provide consistency of application for Stage I vapour controls across Canada.

The present Code is consistent with the two basic requirements of the Plan. It contains the recommended minimum requirements for full Stage I vapour controls implementation in the two specified ozone non-attainment areas, and the requirement that provisions be installed for future implementation of Stage I controls at new facilities across Canada.

The minimum requirements for the LFV and WQC may also be appropriate for other areas where implementation of Stage I controls is contemplated. The extent of application of the minimum requirements in areas other than the LFV and WQC will be determined by the authority having jurisdiction, using due consideration for social and economic factors.

Within the LFV and WQC, the minimum requirements outlined in the code in no way prohibit jurisdictions from adopting more comprehensive or stringent requirements.

A companion support document has been developed by the Canadian General Standards Board (CGSB) entitled: " Standard for Vapour Control Systems in Gasoline Distribution Networks" (CAN/CGSB-3.1000-M). The CGSB standard provides technical standards for equipment used in vapour control systems and is intended to provide consistency and uniformity of installations across Canada.

It is intended that the Code will be adopted by the federal, provincial, regional, or municipal authorities as minimum regulatory requirements or as policy direction. The Code can also be adopted by owners on a voluntary basis as corporate policy, consistent with the principle of responsible environmental stewardship and sustainable economic development.

The National Task Force to develop the Environmental Code of Practice for Vapour Recovery in Gasoline Distribution Networks (hereafter referred to as "the Code"), consisted of representatives from various groups who contributed their expertise and perspectives. (See List of Task Force Members in Appendix A). The Task Force was chaired and co-ordinated by Environment Canada, and included representatives from various provincial environmental jurisdictions. Industry was represented by the Canadian Petroleum Products Institute (CPPI) and the Canadian Conference of Highway Bulk Transporters (CCHBT). Non-government environmental interest groups were represented by a delegate from the Canadian Environmental Network (CEN). The Canadian General Standards Board (CGSB) participated in the development of the Code and developed associated standards for equipment required for gasoline vapour recovery. Other non-member participants are listed in Appendix A.

Prior to establishment of the task force, a Stage I pilot project had been voluntarily initiated by the CPPI in the LFV with the participation of federal, provincial and Greater Vancouver Regional District (GVRD) representatives. Through this work, the CPPI provided valuable technical expertise to the Task Force.

Regulatory expertise was also provided by the Ontario Ministry of the Environment, Air Resources Branch, which had begun implementation of a Stage I control program in Ontario.

It is recognized that the implementation and performance evaluation of the GVRD Project, as well as Ontario's regulatory experience, will provide data for the review and improvement of the Code. It is therefore recommended that the Code be reviewed within two years following the date of publication. The Code should then be reviewed every five years thereafter.

The contributions of all participants and stakeholders who helped develop this Code are gratefully acknowledged.

Inquiries and comments on the Code are welcome and may be sent to:

Chief,
Oil, Gas, and Energy Division
Industrial Programs Branch
Environment Canada
Ottawa, Ontario K1A 0H3

Tel: 819-997-1220
FAX: 819-994-7762

Additional copies of the Code may be obtained from:

The Executive Director
Canadian Council of Ministers of the Environment
3rd Floor, Building 30
139 Tuxedo Avenue
Winnipeg, Manitoba R3N 0H6

Tel: (204) 945-1576
FAX: (204) 945 6807

Introduction

The purpose of the Code is to provide guidance to jurisdictions having authority, and to owners having responsibility, for the control of vapours in gasoline distribution networks. The Code is intended to provide consistency, uniformity and compatibility in the implementation of gasoline vapour controls in Canada.

The Code is divided into a number of Parts:

Part 1 Describes the gasoline distribution networks and the vapour control systems associated with them.

Part 2 Outlines the considerations which should be taken into account when applying vapour controls.

Part 3 Specifies the requirements for implementation of vapour controls in terminals.

Part 4 Specifies the requirements for the implementation of vapour controls in bulk plants.

Part 5 Specifies the requirements for vapour controls implementation in service stations.

Part 6 Specifies the requirements for the implementation of vapour controls on cargo tank trucks.

Part 7 Gives the minimum requirement for gasoline transfer to ships and barges.

Part 8 Gives the minimum requirements for gasoline transfer in marinas.

Part 9 Gives the minimum requirements for gasoline transfer to rail cars.

Part 10 Gives the minimum requirements for aviation gasoline transfers.

Note: Each part identifies requirements for application, equipment, performance, record keeping and compliance. Recommendations are also provided for training and operating practices.

Appendices

Contain various items of information which are referred to in the body of the Code.

Part 1
Description of Gasoline Distribution Networks and Vapour Control Systems

SECTION 1.1 Description of Stage I Controls

1.1.1 As shown in Figure 1, typically, gasoline is transferred from refineries to terminals by pipelines, ships and barges, or unit trains. For the purposes of the Code, it is assumed that all terminals utilize floating roof tanks which cannot be vapour balanced. Gasoline is then transferred either to bulk plants by cargo tank trucks or rail cars, or to service stations by cargo tank trucks. Bulk plants have fixed-roof tanks that can be vapour balanced.

1.1.2 At service stations, gasoline is transferred from cargo tanks into storage tanks. The gasoline is then used to fuel vehicles.

1.1.3 As indicated in Figure 1, vapour losses occur when gasoline liquid displaces vapour from storage tanks or cargo tanks, causing releases into the atmosphere.

1.1.4 Vapour losses in gasoline distribution networks can be greatly reduced by the application of vapour control systems (VCS) as shown in Figure 2.

1.1.4.1 Vapour balancing (VB) is used at bulk plants and service stations. VB entails piping the vapours from cargo tanks being filled back to the tank being emptied, and from storage tanks being filled back into cargo tanks being emptied.

1.1.4.2 Cargo tanks can then return the vapour to a terminal or bulk plant.

1.1.4.3 Submerged fill is also used to reduce vapour generation during transfers.

1.1.4.4 At terminals, a Vapour Recovery Unit (VRU) or Vapour Destruction Unit (VDU) may be used to control emissions of gasoline vapours to the atmosphere.

1.1.4.4.1 A VRU is the preferred method used to process the gasoline vapours, collected in the VCS, back to a storage tank in liquid form.

1.1.4.4.2 A VDU is used to destroy the gasoline vapours, collected in the VCS, by thermal oxidation or other means.

1.1.5 The control of gasoline vapours during bulk transfers in the gasoline distribution network, is commonly known as "Stage I Vapour Recovery" (Figure 2).

SECTION 1.2 Description of Stage II Controls

1.2.1 Vapour losses also occur at service stations during the fueling of vehicles. These vapours can be returned to the underground storage tank through a collection system commonly known as "Stage II Vapour Recovery" (Figure 2).

Enhanced onboard canisters for motor vehicles are an alternative method for capturing gasoline vapours at the fueling point.

Both of these systems are discussed in Appendix D.

Note: The requirements for Stage II controls are not part of this Code.

SECTION 1.3 Statistics on Gasoline Distribution Networks

1.3.1 In Canada in 1989, there were approximately 180 terminals, 2400 bulk plants, and 20,000 retail outlets. These were serviced by roughly 8,000 cargo tank trucks and 500 rail cars.

1.3.2 According to Statistics Canada Catalogue 45-004 Monthly, "Refined Petroleum Products", approximately 35 billion litres of gasoline were distributed in Canada in 1989.

1.3.3 The estimated VOC emissions in Canada in 1989, from all anthropogenic sources, were roughly 1730 kilotonnes (statistics from the NOx/VOC Management Plan).

1.3.3.1 The contribution from gasoline distribution was approximately 60 kilotonnes (3.4%) of VOCs for the whole of Canada (Figure 3).

These vapour losses are volume-equivalent to approximately 75 million litres of gasoline, on the basis of the emission factors contained in the NOx/VOC Management Plan.

1.3.3.2 The contribution from gasoline distribution in the LFV (Figure 4) and WQC (Figure 5) regions was about 32 kilotonnes of VOCs or 53% of the total for Canada.

1.3.4 The full application of Stage I vapour controls in the LFV and WQC, as proposed in the NOx/VOC Management Plan, would have reduced VOC emissions by about 24 kilotonnes, if it had been operational in 1989.

SECTION 1.4 Equipment Standard

1.4.1 The details of the equipment used in the VCS are further discussed in the CGSB standard CAN/CGSB-3.1000-M, entitled "Standard for Vapour Control Systems in Gasoline Distribution Networks". The standard was developed by the Gasoline and Alternate Automotive Fuels Committee of the CGSB.

Part 2
Application of Vapour Control Systems

SECTION 2.1 Background

2.1.1 The Canadian Council of Ministers of the Environment directed that a Management Plan for Nitrogen Oxides and Volatile Organic Compounds be developed for Canada. This Plan, approved by the Ministers in November 1990, included initiatives to control volatile emissions from gasoline distribution.

2.1.2 This Environmental Code of Practice is in accordance with the NOx/VOC Management Plan and specifies the minimum geographical areas and provisions for the application of gasoline vapour control systems for Stage I.

2.1.2.1 In addition to the minimum requirements specified in Section 2.2, the authority having jurisdiction may choose to apply more stringent requirements.

2.1.3 Section 2.2 specifies the latest timing for the application of Stage I controls. Appendix B, Figures 4 and 5, identifies the geographic areas. Vapour recovery systems may be applied in other areas using the considerations listed in Section 2.3.

Note: Figures 4 and 5 show the LFV and WQC regions as defined for the purpose of this Code.The boundaries shown are for descriptive purposes only.

SECTION 2.2 Application Areas and Timing

2.2.1 The requirements for terminals and bulk plants are consistent with Initiative V-603 of the NOx/VOC Plan.

2.2.1.1 VB and recovery is required at gasoline storage and transfer facilities (bulk and marketing terminals), as follows:

New and expanded facilities - VB and recovery in the LFV and WQC, starting May 1, 1992.

Existing facilities - VB and recovery in the LFV and WQC by May 1, 1993.

Note: The throughput limits for application are specified in Parts 3 and 4.

2.2.1.2 Appropriate provisions shall be made for the installation of vapour control systems in all new gasoline terminals and bulk plants in Canada, starting January 1, 1992.

2.2.2 The requirements for service stations are consistent with Initiative V-604 of the NOx/VOC Plan.

2.2.2.1 Requirement for gasoline delivery vapour balancing at service stations, as follows:

New service stations - VB in the LFV and WQC starting May 1, 1992.

Existing service stations - VB in the LFV and WQC by May 1, 1993.

Note: The throughput limits for application are specified in Part 5.

2.2.2.2 Appropriate provisions shall be made for the installation of vapour control systems in all new gasoline service stations in Canada after January 1, 1992.

2.2.3 The requirements for cargo tank trucks are consistent with Initiatives V603 and V604 of the NOx/VOC Plan. Additional requirements are specified in Part 6.

2.2.3.1 Appropriate provisions shall be considered for the installation of vapour recovery equipment on all new cargo tanks for gasoline transport in Canada after January 1, 1992.

SECTION 2.3 Other Considerations

2.3.1 Owners of gasoline distribution terminals, bulk plants and service stations may choose to voluntarily implement vapour control systems as a corporate policy.

The Code of Practice should be used as a guide to the application of voluntary controls.

2.3.2 The Code may be applied to areas other than those identified in the NOx/VOC Management Plan and may be implemented at any time.

2.3.3 To foster sustainable economic development, and as a measure promoting environmental stewardship, gasoline vapour control systems may be considered for application in areas other than the LFV and WQC. In such cases, authorities and owners should take the following factors into account.

2.3.3.1 Air Quality - Local and regional concentrations of ozone and volatile organic compounds, and temporal changes in these concentrations, are factors for consideration. Receptor exposure as a factor of population density and pollutant transport should also be evaluated.

2.3.3.2 Technology and Timing - The technology for vapour control is well established, and such systems can be gradually phased in in a given region. Factors that should be

considered include timetables for equipment delivery and resources available for installation.

2.3.3.3 Socio-Economic Impacts - Factors that should be evaluated include:

- costs associated with negative environmental impacts,
- facility size and throughput,
- facility age and future operating plans,
- cost-effectiveness of controls,
- vapour control impact on total emissions,
- regional employment impacts, and
- inter-regional trade boundaries.

2.3.3.4 Jurisdictions having authority may consider other factors in developing their environmental protection policies.

Part 3
Vapour Control Systems in Terminals

The implementation of a vapour control system (VCS) in a terminal loading gasoline shall be in accordance with the guidelines and criteria stated in this Part of the Code.

SECTION 3.1 Application Guide

Implementation of these provisions shall be in accordance with Part 2 of this Code.

3.1.1 Minimum provisions for all of Canada.

3.1.1.1 All terminals shall be equipped to carry out gasoline transfer by means of submerged fill.

3.1.1.2 At all terminals where diesel fuel is loaded following a delivery of gasoline (switch loading), a VCS shall be used, when required under the provisions of the Code.

3.1.2 Terminals in the LFV and WQC regions.

3.1.2.1 a) New terminals having a gasoline throughput greater than 250 ML per year shall install a vapour recovery unit (VRU) and associated piping, in accordance with the Code.

b) New terminals transferring less than 250 million but more than 25 ML of gasoline per year shall carry out vapour recovery and processing by means of either a VRU or a vapour destruction unit (VDU). The type of unit employed shall be determined by the requirements of the local authority having jurisdiction, with due consideration for Section 2.3.3 of this Code.

3.1.2.2 a) Terminals undergoing expansion which increases gasoline throughput to a total of 250 ML per year (or greater) shall be considered as new terminals.

b) Terminals undergoing expansion which increases gasoline throughput to a total of 50 ML or greater, or terminals that have added incremental throughput greater than 25 ML of gasoline, shall be considered as new terminals. In these terminals, vapour recovery and processing should be carried out either by a VRU or a VDU. The type of unit employed should be determined by the requirements of the local authority having jurisdiction, with due consideration for Section 2.3.3 of this Code.

c) All other expanded facilities shall be considered as existing facilities.

3.1.2.3 a) Existing terminals having a gasoline throughput greater than 250 ML per year shall install a (VRU) and associated piping, and shall operate the unit in accordance with the Code.

b) Existing terminals transferring less than 250 million but more than 50 ML of gasoline per year of gasoline, shall carry out vapour recovery and processing either by VRU or VDU. The type of unit employed should be determined by the requirements of the local authority having jurisdiction, with due consideration for Section 2.3.3 of this Code.

3.1.3 Terminals located outside the LFV and WQC regions --

3.1.3.1 As a minimum, for new terminals, consideration shall be given to the provisions for the future installation of a VCS in accordance with the application limits outlined in Section 3.1.2 of this Code.

3.1.3.2 Owners of terminals in other areas may apply the Code in accordance with the guidance provided in Part 2.

3.1.3.3 Where an authority having jurisdiction has decided to regulate on the basis of the Code, Part 2 shall be consulted for potential modification of throughput application limits listed in Section 3.1.2.

SECTION 3.2 Equipment Standards

3.2.1 Vapour recovery equipment shall meet the requirements of the Standard CAN/CGSB-3.1000-M.

SECTION 3.3 Performance Criteria

3.3.1 The VRU or VDU shall be designed to produce stack emissions containing less than or equal to 35 mg of hydrocarbon per litre of gasoline transferred to cargo tanks, as measured by the procedure specified in the CAN/CGSB-3.1000-M standard.

Note: The emission limit of 35 mg/L at the VRU or VDU stack exit provides an estimated 97% reduction of the vapours normally escaping to the atmosphere during gasoline transfers to cargo tanks at a terminal.

3.3.1.1 The VRU or VDU unit shall be tested yearly by the method specified in Section 3.3.1, or by an alternative method approved by the authority having jurisdiction.

3.3.2 The VCS shall process gasoline vapours generated during loading at all times, except during periods of planned maintenance. Maintenance shall not be planned for the period May 1 to September 15.

3.3.2.1 Shutdowns longer than 24 hours shall be reported to the authority having jurisdiction.

3.3.2.2 Total operating service factor for the VDU or VRU shall be greater than 95 percent.

3.3.3 The VCS shall be leak free and vapour tight according to the test specified in CAN/CGSB-3.1000-M.

SECTION 3.4 Record Keeping

3.4.1 The record keeping format should be standardized to facilitate implementation and provide consistency for any user or regulatory agency. All forms shall meet the requirements of the jurisdiction having authority. A sample record keeping form is included in Appendix F.

3.4.2 All terminals shall keep records of volumes of gasoline loaded for a minimum of three years, and provide supporting documentation for review by the authority having jurisdiction, on request.

3.4.3 Records of unit maintenance downtime shall be kept to enable determination of the operating service factor.

3.4.4 The authority having jurisdiction shall have access to VCS records and all supporting documentation.

SECTION 3.5 Compliance

3.5.1 The owner/operator shall ensure that the compliance requirements as defined in the applicable regulations are met.

3.5.2 As a minimum, a terminal shall be considered to be in compliance when it has passed the performance tests specified in the CAN/CGSB-3.1000-M Standard.

3.5.3 Routine inspections for terminal facilities could include the following checks:

- review of test results records,
- check of gasoline throughput records,
- visual inspection of connections (Figure 8),
- observation of cargo tank loading procedures, and

- leak testing of the connected system during loading by means of a combustible gas detector.

SECTION 3.6 Training

3.6.1 The terminal owner/operator shall be responsible for providing written standard operating procedures and for ensuring the adequate training of personnel operating the facility.

3.6.2 The terminal owner/operator shall take reasonable measures to ensure that both terminal and cargo tank personnel operate the vapour recovery equipment in accordance with standard operating procedures.

3.6.3 Training records shall be available for inspection by the authority having jurisdiction.

3.6.4 The authority having jurisdiction shall ensure that its inspectors receive adequate training.

SECTION 3.7 Operating Practices

3.7.1 The terminal owner/operator shall demonstrate due diligence in ensuring that VCS piping systems are maintained leak free and vapour tight as determined by the CAN/CGSB-3.1000-M procedure.

3.7.2 The terminal owner/operator shall periodically check the vapour recovery piping for condensed gasoline which could reduce VCS performance.

3.7.2.1 Vapour recovery systems should be designed to minimize low spots where condensed materials could collect.

3.7.2.2 To minimize spills, collection systems for condensed materials should be provided.

3.7.3 The terminal owner/operator shall ensure that all vapour hoses for cargo tank hookups are properly equipped with back flow protection to prevent vapour release to the atmosphere, or a liquid spill, from an idle connection.

3.7.4 The terminal owner/operator shall ensure that any permissive system on the loading rack is operable, or that proper bypass procedures are followed to avoid releases.

3.7.5 Cargo tank operators shall be responsible for the proper connection of vapour recovery hose(s) while loading. The cargo tank operator shall ensure that the

connections are made as prescribed in the equipment standard CAN/CGSB-3.1000-M and the terminal's standard loading procedures.

3.7.6 To provide optimum performance of the VRU or VDU equipment, the terminal owner/operator shall ensure that written standard maintenance procedures (including preventive maintenance) are developed.

Part 4
Vapour Control Systems in Bulk Plants

The implementation of vapour balancing (VB) in a bulk plant loading gasoline shall be in accordance with the guidelines and criteria stated in this Part of the Code.

SECTION 4.1 Application Guide

Implementation of these provisions shall be in accordance with Part 2 of this Code.

4.1.1 Minimum provisions for all of Canada.

4.1.1.1 All bulk plants shall be equipped to carry out submerged fill, for gasoline transfer.

4.1.1.2 At all bulk plants where diesel fuel is loaded following a delivery of gasoline (switch loading), VB shall be used, when required under the provisions of the Code.

4.1.2 Bulk plants in the LFV and WQC regions.

4.1.2.1 New bulk plants having a gasoline throughput greater than 4.5 ML per year shall be equipped with VB equipment for both receipts from (unloading) and delivery to (loading) cargo tanks, at the site.

4.1.2.2 a) Bulk plants undergoing expansion which increases gasoline throughput to a total greater than 20 ML per year, or that have added incremental throughput greater than 4.5 ML per year, shall be equipped with VB equipment for both receipts (unloading) and delivery to (loading) cargo tanks, at the site.

b) All other expanded facilities shall be considered as existing facilities.

4.1.2.3 a) Existing bulk plants with an annual gasoline throughput greater than 4.5 million but less than 20 ML shall be equipped with VB equipment for receipt (unloading) of product only.

b) Existing bulk plants with an annual gasoline throughput of 20 ML or greater shall be equipped with VB equipment for both receipts from (unloading) and delivery to (loading) cargo tanks at the plant.

4.1.3 Bulk plants located outside the LFV and WQC regions.

4.1.3.1 As a minimum, provisions for the future installation of VB in new bulk plants shall be considered in accordance with the application limits outlined in Section 4.1.2 of this Code.

4.1.3.2 Owners of bulk plants in other areas may apply the Code in accordance with the guidance provided in Part 2 of this Code.

4.1.3.3 Where an authority having jurisdiction has decided to regulate on the basis of the Code, Part 2 shall be consulted for potential modification of throughput application limits listed in Section 4.1.2.

SECTION 4.2 Equipment Standards

4.2.1 Vapour balancing equipment at bulk plants shall meet the requirements of the Standard CAN/CGSB-3.1000-M.

SECTION 4.3 Performance Criteria

4.3.1 The performance of the VB equipment at bulk plants shall be ensured by the use of equipment recommended by the CAN/CGSB-3.1000-M Standard, Section on Bulk Plants.

Note: The use of the recommended equipment will result in a reduction of approximately 90% of the gasoline vapours normally emitted during transfers at bulk plants.

4.3.2 The VB equipment shall be operable at all times. The authority having jurisdiction shall be notified of shutdowns lasting more than 24 hours (1 day).

4.3.3 The VB equipment shall be leak free and vapour tight as specified by the test in CAN/CGSB-3.1000-M.

SECTION 4.4 Record Keeping

4.4.1 The record keeping format should be standardized to facilitate implementation and provide consistency for any user or regulatory agency. All forms shall meet the requirements of the jurisdiction having authority. A sample record keeping form is included in Appendix F.

4.4.2 All bulk plants shall keep annual records of volumes of gasoline loaded for a minimum of three years, and provide supporting documentation for review by the authority having jurisdiction, on request.

4.4.3 Records of VB equipment maintenance downtime shall be kept to enable determination of the operating service factor.

4.4.4 The authority having jurisdiction shall have access to VCS records and all supporting documentation.

SECTION 4.5Compliance

4.5.1 The owner/operator shall ensure that the compliance requirements as defined in the applicable regulations are met.

4.5.2 As a minimum, a bulk plant shall be considered to be in compliance when it has passed the performance tests specified in the CAN/CGSB-3.1000-M Standard.

4.5.3 Routine inspection for bulk plant facilities could include the following checks:

- review of test results records,
- check of gasoline throughput records,
- visual inspection of connections (Figure 9),
- observation of cargo tank loading and unloading procedures, and
- leak testing of the connected system during loading by means of a combustible gas detector.

SECTION 4.6 Training

4.6.1 To ensure adequate training of the personnel operating the facilities, the bulk plant owner/operator shall be responsible for providing written standard operating procedures.

4.6.2 The bulk plant owner/operator shall take reasonable measures to ensure that both bulk plant and cargo tank personnel operate the VB equipment in accordance with standard operating procedures.

4.6.3 Training records shall be available for inspection by the authority having jurisdiction.

4.6.4 The authority having jurisdiction shall ensure that its inspectors receive adequate training.

SECTION 4.7 Operating Practices

4.7.1 The bulk plant owner/operator shall demonstrate due diligence in ensuring that the VCS piping systems are maintained leak free and vapour tight as determined by the CAN/CGSB-3.1000-M procedure.

4.7.2 The bulk plant owner/operator shall periodically check the VB piping for condensed gasoline which could reduce VB performance.

4.7.2.1 VB systems should be designed to minimize low spots where condensed materials could collect.

4.7.2.2 To minimize spills, collection systems for condensed materials should be provided.

4.7.3 The bulk plant owner/operator shall ensure that all vapour connections for cargo tank hookups are properly equipped with back flow protection to prevent vapour release to the atmosphere.

4.7.4 The bulk plant owner/operator shall ensure that any permissive system on the loading rack is operable or that proper bypass procedures are followed.

4.7.5 Cargo tank operators shall be responsible for the proper connection of vapour recovery hose(s) while loading. The cargo tank operator shall ensure that the connections are made as prescribed in the equipment standard CAN/CGSB-3.1000-M and the bulk plant standard loading procedures.

4.7.6 To provide optimum performance of VB equipment, the bulk plant owner/operator shall ensure that written standard maintenance procedures (including preventive maintenance) are developed.

Part 5
Vapour Control Systems in Service Stations

The implementation of vapour balancing (VB) in a service station shall be in accordance with the guidelines and criteria stated in this Part of the Code.

SECTION 5.1 Application

Implementation of these provisions shall be in accordance with Part 2 of the Code.

5.1.1 Minimum provisions for all of Canada.

5.1.1.1 All service stations shall be equipped with submerged fill, for gasoline transfer.

5.1.2 Service Stations in the LFV and WQC regions.

5.1.2.1 New service stations shall be equipped with VB equipment.

5.1.2.2 Expanded facilities shall be considered as existing facilities.

5.1.2.3 Existing service stations with annual gasoline throughput of 1.0 ML or greater, shall be equipped with VB equipment to collect vapours on the receipt of product, when supplied from either:

a) an existing bulk plant with yearly throughput greater than 20 ML, or,

b) from an existing terminal with yearly throughput greater than 50 ML, or,

c) from a new terminal with a yearly throughput greater than 25 ML of gasoline per year, or,

d) from a new bulk plant with yearly throughput greater than 4.5 ML of gasoline per year.

5.1.3 Service stations located outside the LFV and WQC regions.

5.1.3.1 As a minimum, provisions for the future installation of VB in new service stations shall be considered in accordance with the application limits, outlined in section 5.1.2.

5.1.3.2 Owners of service stations in other areas may apply the Code in accordance with the guidance provided in Part 2 of the code.

5.1.3.3 Where an authority having jurisdiction has decided to regulate on the basis of the Code, Part 2 shall be consulted for potential modification of throughput application limits listed in Section 5.1.2.

SECTION 5.2 Equipment Standards

5.2.1 VB equipment at service stations shall meet the requirements of the Standard CAN/CGSB-3.1000-M.

SECTION 5.3 Performance Criteria

5.3.1 The performance of the VB equipment at service stations shall be ensured by the use of equipment recommended by the CAN/CGSB-3.1000-M Standard, Section on Service Stations.

Note: Use of the recommended vapour recovery equipment will result in an approximate 90% reduction of the gasoline vapours normally emitted during product drop to the underground storage tanks.

5.3.2 The VB equipment shall be operable at all times. The authority having jurisdiction shall be notified of shutdowns lasting more than 24 hours (1 day).

5.3.3 The VB equipment shall be leak free and vapour tight in accordance with the test specified in CAN/CGSB-3.1000-M.

Note: for service stations where a manifolded vapour return line is used, the expected recovery may be better if a PV vent is used on the underground storage tank vent.

Caution: PV vents may freeze in cold weather and cause tank collapse during vehicle refueling.

They may also produce enough back pressure on the system to cause back flow and spill of gasoline upon liquid disconnection.

SECTION 5.4 Record Keeping

5.4.1 The record keeping format should be standardized to facilitate implementation and provide consistency for any user or regulatory agency. All forms shall meet the requirements of the jurisdiction having authority. A sample record keeping form is included in Appendix F.

5.4.2 All service stations shall keep records of volumes of gasoline loaded for a minimum of three years, and provide supporting documentation for review by the authority having jurisdiction, on request.

5.4.3 Records of VB equipment downtime shall be kept.

5.4.4 The authority having jurisdiction shall have access to VB records and all supporting documentation.

SECTION 5.5 Compliance

5.5.1 The owner/operator shall ensure that the compliance requirements as defined in the applicable regulations are met.

5.5.2 As a minimum, a service station shall be in compliance when it has passed the performance tests as described in the CAN/CGSB-3.1000-M Standard.

5.5.3 Routine inspection guidelines for service station facilities could include the following checks:

- review of test results records,
- check of gasoline throughput records,
- visual inspection of connections (Figure 10,11),
- observation of cargo tank unloading procedures, and
- leak test of the vapour control system.

SECTION 5.6 Training

5.6.1 To ensure adequate training of the personnel operating the facilities, the service station owner/operator shall be responsible for providing written standard operating procedures.

5.6.2 The service station owner/operator shall take reasonable measures to ensure that the service station personnel and cargo tank operator use the VB equipment in accordance with standard operating procedures.

5.6.3 Training records shall be available for inspection by the authority having jurisdiction.

5.6.4 The authority having jurisdiction shall ensure that its inspectors receive adequate training.

SECTION 5.7 Operating Practices

5.7.1 The service station owner/operator shall demonstrate due diligence in ensuring that the VB piping systems are maintained leak free and vapour tight as determined by the CAN/CGSB-3.1000-M procedure.

5.7.2 The service station operator shall make sure that the vapour recovery adapters at the underground storage tanks are accessible to the cargo tank operator.

5.7.3 The service station operator shall periodically check to ensure that all vapour hoses to cargo tank hookups are properly carried out, to avoid release of vapour and creation of a hazardous situation at the station.

5.7.4 To minimize spills, the cargo tank operator shall take proper care with hose connection, handling, and disconnection.

5.7.5 Vapour hose connections shall be made before liquid hose hookup to ensure no product is transferred without control of emissions. Refer to CAN/CGSB-3.1000-M, Operating Procedures at service stations, for the recommended product delivery hookup sequence.

Part 6
Vapour Control Systems for Cargo Tank Trucks

The implementation of vapour balancing (VB) on a cargo tank transporting gasoline shall be in accordance with the guidelines and criteria stated in this Part of the Code.

SECTION 6.1 Application Guide

Implementation of these provisions shall be in accordance with Part 2 of this Code.

6.1.1 Minimum provisions for all of Canada.

6.1.1.1 All gasoline product transfers to cargo tanks shall be carried out by submerged fill either using a drop tube through the loading hatch, or by top tight fill, or by bottom loading.

6.1.1.1 Cargo tank trucks delivering product through a hose reel shall be exempted from VB requirements at the delivery site.

6.1.2 Cargo tanks in the LFV and WQC regions.

6.1.2.1 All new cargo tank trucks transporting gasoline from a facility where vapour control systems are required by the authority having jurisdiction shall be equipped with vapour recovery equipment.

6.1.2.2 All existing cargo tank trucks of 21,000 litres total capacity or greater transporting gasoline from a facility where vapour control systems are required by the authority having jurisdiction shall be equipped with the necessary components to contain gasoline vapours. (Figure 12)

6.1.3 Cargo tanks in service outside the LFV and WQC regions.

6.1.3.1 Appropriate provisions shall be considered for the future installation of vapour recovery equipment on all new cargo tanks.

6.1.3.2 Owners of cargo tanks in other areas may apply the Code in accordance with the guidance provided in Part 2.

6.1.3.3 Where an authority having jurisdiction has decided to regulate on the basis of the Code, Part 2 shall be consulted for potential modification listed in Section 6.1.2.

6.1.4 For the purpose of this Code, cargo tank trucks are the same as highway tanks, tanker trucks, tank trucks, or cargo tanks carrying gasoline.

SECTION 6.2 Equipment Standards

6.2.1 Vapour recovery equipment for cargo tank trucks shall meet the requirements of Standard CAN/CGSB-3.1000-M, Section on cargo tanks.

SECTION 6.3 Performance Criteria

6.3.1 Vapour recovery equipment installed on cargo tanks shall be vapour tight as defined by the annual test specified in CAN/CGSB-3.1000-M, section on cargo tank testing procedure.

6.3.1.1 If the annual test is failed, the cargo tank shall be either repaired immediately or taken out of service until repairs have been done, then retested.

6.3.2 The cargo tank shall be capable of passing a random leak test at any time during the year. This would be done during loading of the cargo tank, with a combustible gas detector measuring less than 100 percent of LEL at 25 millimetres from any leak source on the cargo tank openings or fittings.

6.3.2.1 A cargo tank, which is found to be leaking by a random leak test or visual inspection, shall not continue operation longer than two working days without repair.

SECTION 6.4 Record Keeping

6.4.1 The record keeping format should be standardized to facilitate implementation and provide consistency for any user or regulatory agency. All forms shall meet the requirements of the jurisdiction having authority. A sample record keeping form is included in Appendix F.

6.4.2 The cargo tank owner shall keep the documentation on the annual pressure test for a minimum of three years, and provide supporting documentation for review by the authority having jurisdiction, on request.

6.4.3 The owner shall keep the records of cargo tank vapour recovery equipment maintenance.

6.4.4 The authority having jurisdiction shall have access to VB records and all supporting documentation.

6.4.5 The cargo tank test site shall keep a record of the last yearly test for a specific cargo tank.

SECTION 6.5 Compliance

6.5.1 The owner/operator shall ensure that the compliance requirements as defined in the applicable regulations are met.

6.5.2 As a minimum, a cargo tank shall be in compliance when it has passed the performance tests as described in the CAN/CGSB-3.1000-M Standard, Section on Test Procedures.

6.5.3 Routine inspection guidelines for cargo tanks could include the following checks:

- review of test results records,
- check of cargo tank capacity,
- visual inspection of vapour recovery equipment, (see Figure 12)
- observation of cargo tank loading or unloading procedures, and
- leak test of the vapour control system.

6.5.4 The annual vapour tightness test date marking shall be mounted or attached on the cargo tank in clear and plain view as specified in the CAN/CGSB-3.1000-M standard.

6.5.5 The period elapsed between annual tests shall be 12 months maximum, as determined by test month.

SECTION 6.6 Training

6.6.1 To ensure adequate training of the operator who loads and unloads the product, the cargo tank owner shall be responsible for providing adequate written standard operating procedures.

6.6.1.1 This should be done in the context of any other legislation or requirements which requires drivers to be trained before operating any such vehicle, such as the Transport of Dangerous Goods Act .

6.6.2 The cargo tank owner shall take reasonable measures to ensure that the cargo tank personnel uses the VB equipment in accordance with standard operating procedures.

6.6.3 Training records shall be available for inspection by the authority having jurisdiction.

6.6.4 The authority having jurisdiction shall ensure that its inspectors receive adequate training.

SECTION 6.7 Operating Practices

6.7.1 The cargo tank operator shall ensure that the piping systems are leak free and vapour tight.

6.7.2 To maintain equipment performance, the cargo tank operator shall make sure that the vapour recovery adapters, elbows, and other fittings are in good mechanical working order.

6.7.3 The cargo tank operator is responsible to ensure that all vapour hoses to cargo tank hookups are properly carried out, to avoid release of vapour and create a hazardous situation.

6.7.4 Vapour hoses shall be connected before the liquid hoses to ensure that no product transfer is done without control of emissions.

6.7.5 The cargo tank operator shall pay particular attention to avoid spills. Even a small spill during cargo tank loading or unloading can negate the effect of vapour recovery.

6.7.6 Whenever loading diesel fuel (switch loading or other) at a rack equipped with a vapour control system (VCS), cargo tanks equipped with VB shall be connected to the VCS.

6.7.7 To ensure minimum vapour escape, opening of dome hatches for visual inspection shall be minimized and in no case exceed a period of 3 minutes.

NOTE: A cargo tank filled with gasoline vapours contains a saturated gasoline-air mixture which has a hydrocarbon concentration greater than the higher explosivity limit.

This mixture is safer to transport than the present gasoline-air mixture resulting from gasoline unloading with air in-breathing through the dome hatches.

Part 7
Vapour Control Systems for Ships and Barges

SECTION 7.1 Application of Code

7.1.1 Gasoline transfers to ships and barges shall be done by submerged fill.

7.1.2 Considerations for the implementation of vapour control systems for ships and barges has been deferred to the next issue of the Code.

See Appendix C for explanatory notes.

Part 8
Vapour Control Systems in Marinas

SECTION 8.1 Application Guide

8.1.1 This section covers the application of the Code to the small craft fueling facilities commonly named Marinas.

8.1.2 Onshore storage tanks for marinas shall be considered equivalent to service stations for the purpose of site evaluation. Volume criteria shall be the same as for service stations, as stated in Section 5.1.3.

8.1.3 Offshore marinas are a special form of service station. There will be no action taken with regard to these facilities at this time.

8.1.4 Gasoline transfers to storage tanks at marinas shall be done by submerged fill.

8.1.5 Considerations for onshore marinas to establish performance criteria, record keeping, compliance, training, and recommended practices shall be reviewed using Part 5 of this Code.

SECTION 8.2 Equipment Standards

8.2.1 The vapour recovery equipment for onshore (land based) marinas shall be installed as per CAN/CGSB-3.1000-M, Section on bulk plants.

Part 9
Vapour Recovery for Rail Car Systems

SECTION 9.1 Application of Code

9.1.1 All gasoline transfers to rail cars shall be done by submerged fill.

9.1.2 Considerations for the implementation of vapour control systems for rail car loading has been deferred to the next issue of the Code.

See Appendix C for explanatory notes.

Part 10
Aviation Gasoline Facilities

SECTION 10.1 Application Guide

10.1.1 All transfers to aviation gasoline storage tanks shall be done by submerged fill.

10.1.2 All aviation gasoline transferred to cargo tanks shall be done by submerged fill, using either a drop tube in the loading hatch or by bottom loading.

10.1.3 Development of the application of vapour control systems to aviation gasoline facilities has been deferred to the next issue of the Code.

See Appendix C for explanatory notes.

Appendix A
List of Task Force Members

D. Maddocks	Newfoundland Department of the Environment
C. Mackinnon	Prince Edward Island Department of Environment
F. MacNeil	Nova Scotia Department of the Environment
J. McNeill*	Nova Scotia Department of the Environment
N. Dy	Ministère de l'environnement du Québec
R. Brûlotte	Ministère de l'environnement du Québec
J. Servais	Ministère de l'énergie et des ressources Québec
R. Gignac*	Ministère de l'énergie et des ressources Québec
Y. Bourassa	Communauté urbaine de Montréal
J. Knight	New Brunswick Department of Municipal Affairs and Environment
W.J. Shaffner*	New Brunswick Department of Municipal Affairs and Environment
T. Stopps	Ontario Ministry of the Environment
L. Strachan	Manitoba Department of Environment
L. Lechner	Saskatchewan Environment and Public Safety
W. Macdonald	Alberta Environment
F. Whitthoeft*	Alberta Environment
J.R. Marshall*	British Columbia Ministry of the Environment
K. Bhattacharyya	British Columbia Ministry of the Environment
S. Mohr	CPPI, Western Division, (Esso Petroleum)
D. Bisset	CPPI, National, (Shell Canada)
H. Van Boxmeer	CPPI, Québec Division, (Ultramar)
D. Ledingham	CPPI, Ontario Division, (Shell Canada)
A.J. Durand*	CPPI, Ontario Division, (Esso Petroleum)
E.E. Barber*	CPPI, Ontario Division, (PetroCan)
D.G. Normandin	Independents, (Turbo Resources)
J. Jenkins*	Independents, (Turbo Resources)
G. Scott	Canadian Conference of Highway Bulk Transporters (TRIMAC)
D.J. Wisdom	Canadian Conference of Highway Bulk Transporters (Provost Transport)
B. Walker	STOP, Montréal (Canadian Environment Network Representative)
E. Wituschek	Environment Canada, British Columbia Region
R.R. Perras	Environment Canada, **(Task Force Coordinator)**
P.G. Finlay*	Environment Canada, **(Task Force Chairperson)**
D.W. Draper	Environment Canada, **(Chairperson, Author of NOx/VOC Management Plan)**

* Resigned from the National Task Force prior to completion of the Environmental Code

LIST OF TASK FORCE MEMBERS

Corresponding Members

J. Gerdels	Ontario Ministry of Consumer and Corporate Relations
R. Charest	Canadian General Standards Board (CGSB)
R. Falkiner	CGSB, (Esso Petroleum)
S. Llewellyn	Environment Canada, Ontario Region
B. Nadon	Environment Canada, Québec Region
V. Marawha	Environment Canada, West & North Region
J. Kozak	Environment Canada, Maritimes Region
R. Lafleur	CPPI, Ottawa
M. Smith	North West Territories, Renewable Resources
W. Bilawich	Yukon Renewable Resources
A. MacGregor	Canadian Environment Network
B. Melbourne	Environment Canada, Federal Facilities
J.B. Mills	Greater Vancouver Regional District
R. Hutchinson	Canadian Trailers and Tank Manufacturers Assoc.
D. D. Murray	CPPI, Western Division, (Shell Canada)
F. Seif	CPPI, Ontario Division, (Petro-Canada)

NON-MEMBER TASK FORCE PARTICIPANTS
(PROVIDED TECHNICAL EXPERTISE)

J. Morgester	California Air Resources Board
S. Shedd	United States Environmental Protection Agency
M. Jordan	John F. Jordan Service Company, Louisville, Ky.
D. Meigs	Tulsa Vapour Recovery Services, Portland, Ore.
R. Norton	Pacific Environmental Services Company, Virginia
J. Rumble	EMCO-WHEATON, North Carolina
P. Griffiths	EMCO-WHEATON, North Carolina
B. Stewart	EMCO-WHEATON, Quebec and Maritimes
J. Walton	DOVER Corporation, Toronto
Y. Besner	DOVER Corporation, Montreal

LIST OF FIGURES

Figure 1	Gasoline Distribution Network Without Vapour Recovery
Figure 2	Gasoline Distribution Network With Vapour Control Systems (VCS)
Figure 3	VOC Emissions in Canada - Gasoline Contribution to VOCs
Figure 4	Lower Fraser Valley Region, British Columbia
Figure 5	Windsor-Quebec City Corridor Region
Figure 6	Cargo Tank Top Loading
Figure 7	Cargo Tank Bottom Loading
Figure 8	Terminal Vapour Control Connections
Figure 9	Bulk Plant Vapour Control Connections
Figure 10	Dual Point Vapour Balance Connections
Figure 11	Coaxial Vapour Balance Connections
Figure 12	Cargo Tank Vapour Control System

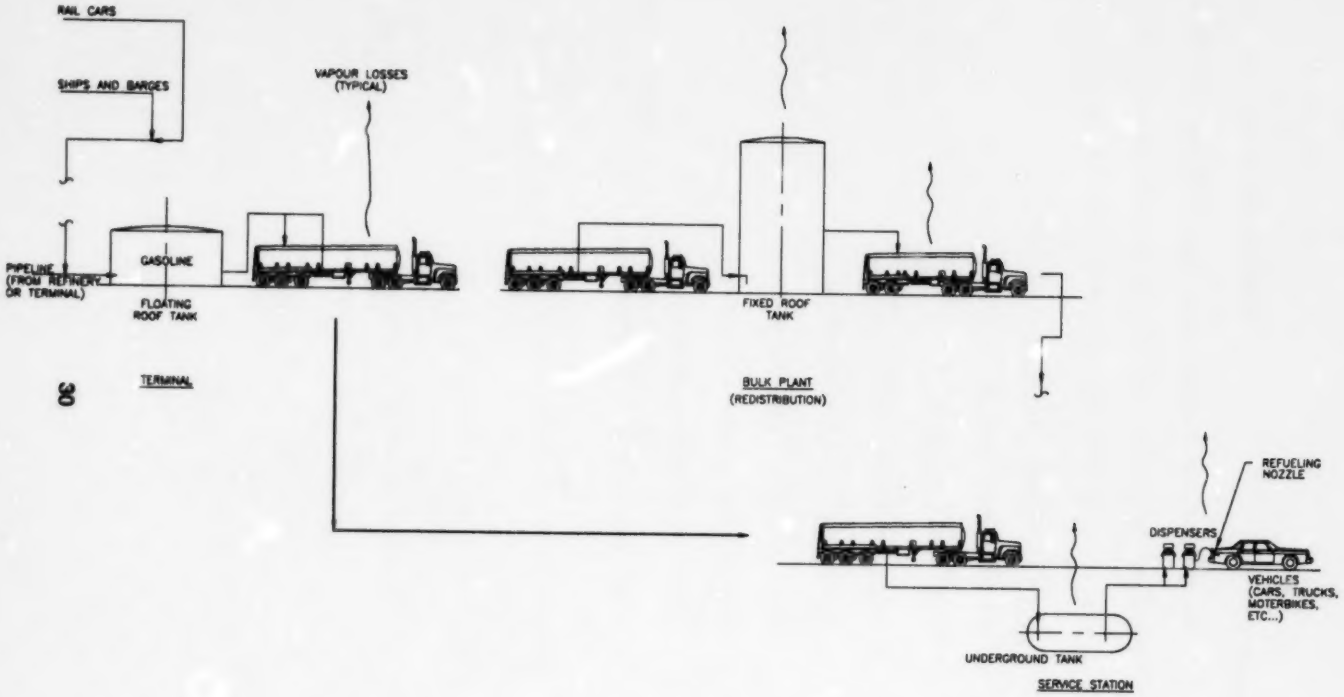


FIGURE 1
GASOLINE DISTRIBUTION NETWORK WITHOUT VAPOUR RECOVERY

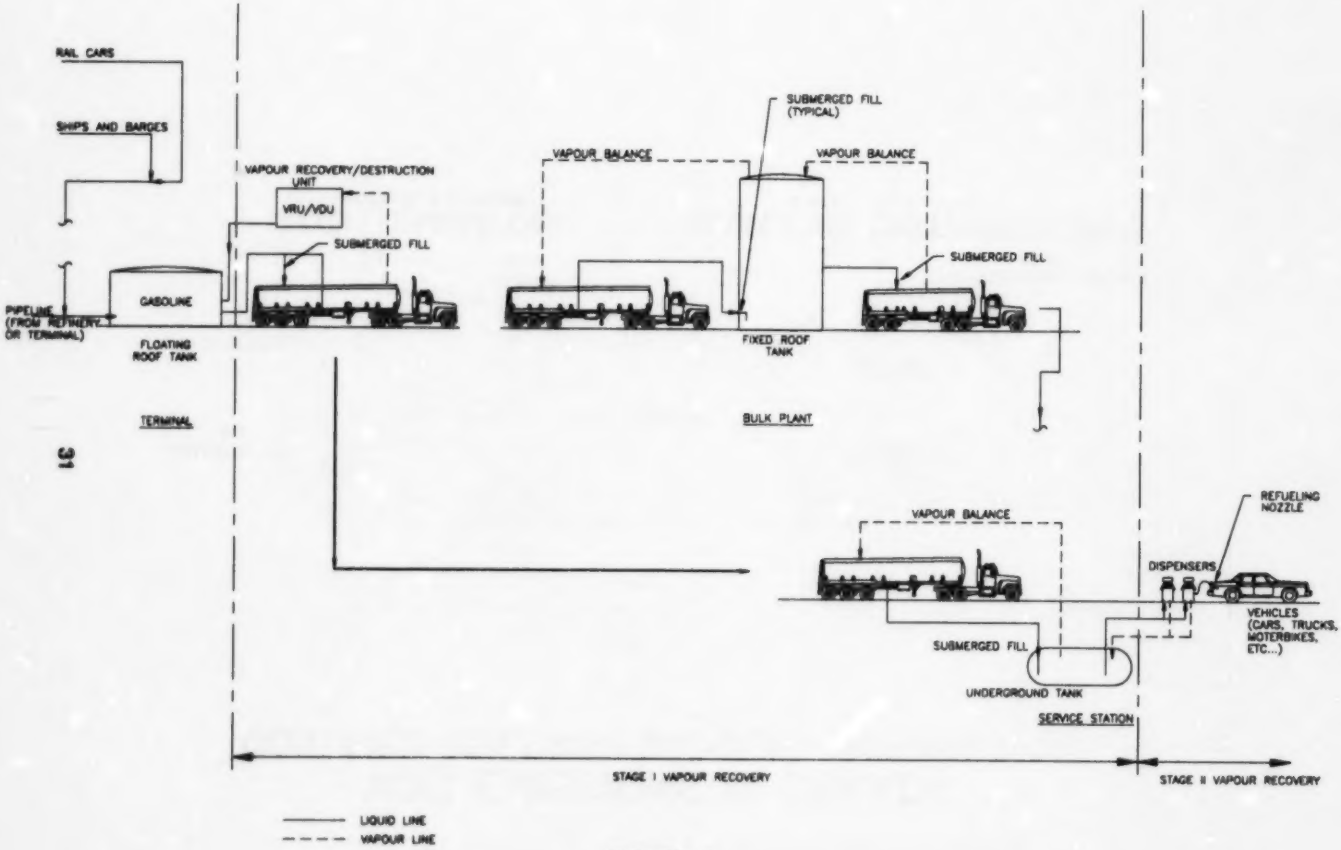
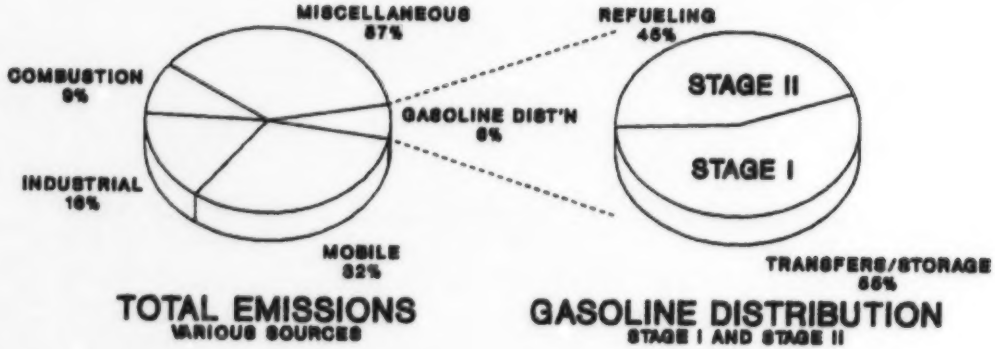


FIGURE 2

GASOLINE DISTRIBUTION NETWORK WITH VAPOUR CONTROL SYSTEMS (VCS)

VOC EMISSIONS IN CANADA
CONTRIBUTION FROM GASOLINE DISTRIBUTION



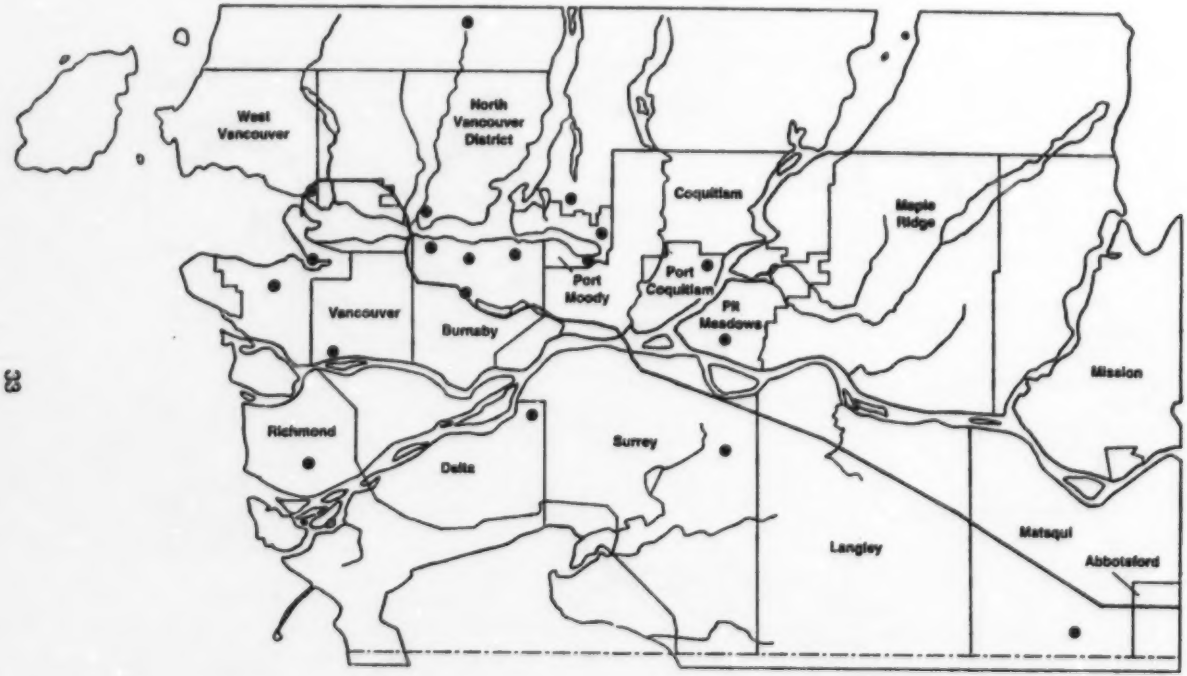


FIGURE 4. LOWER FRASER VALLEY REGION

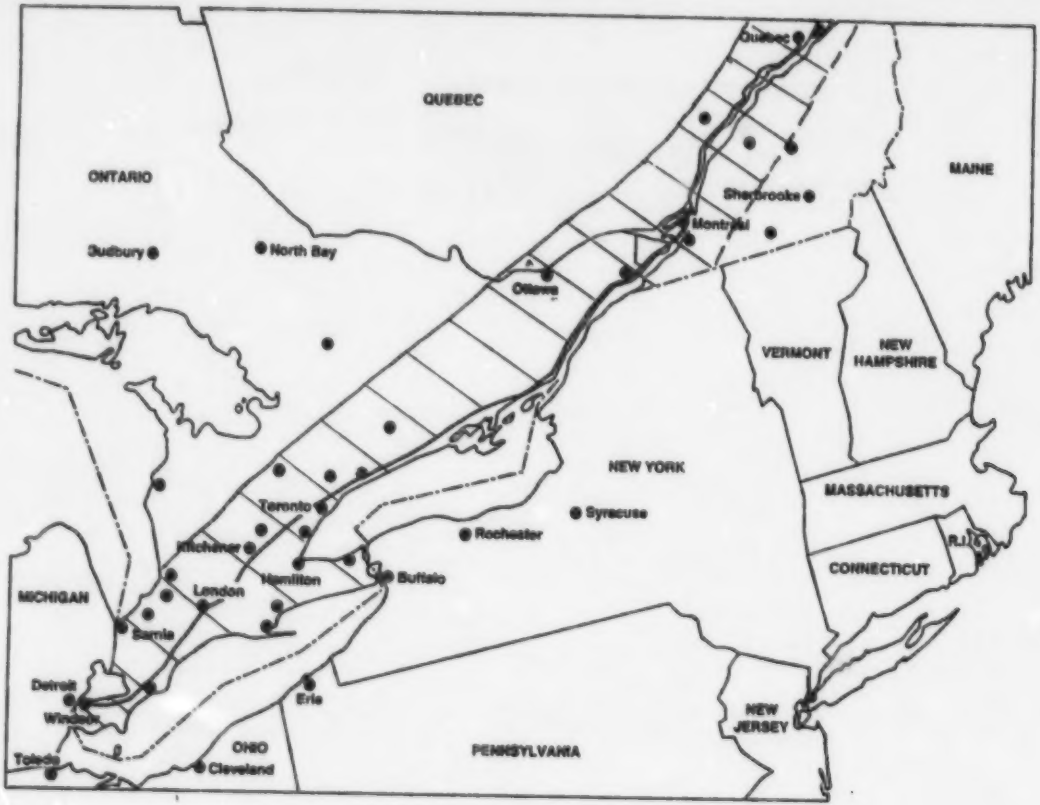


FIGURE 5. WINDSOR-QUEBEC CITY CORRIDOR REGION

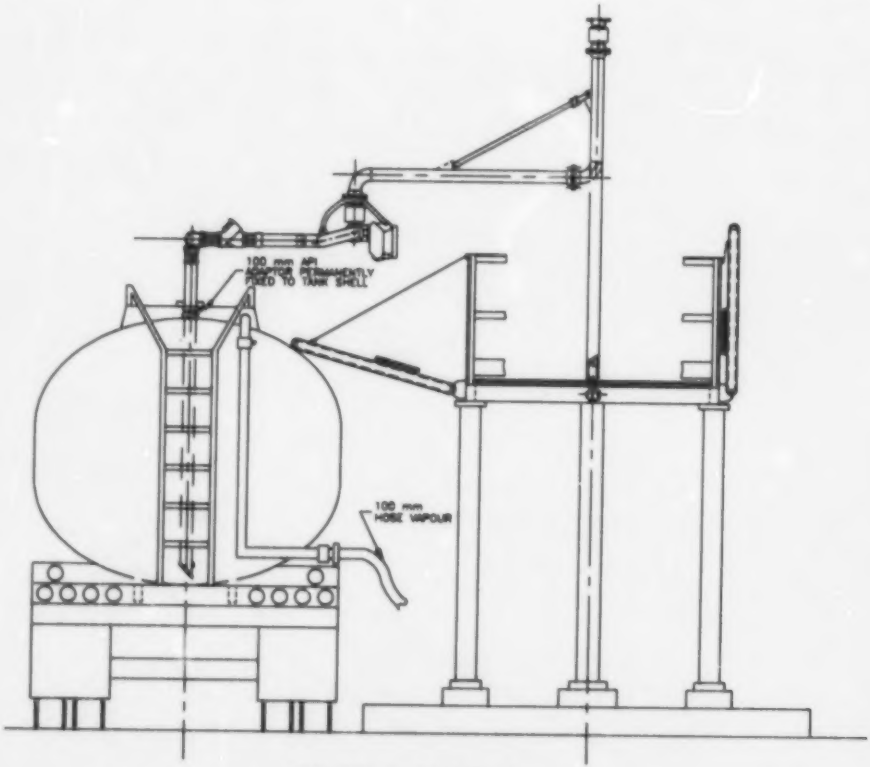


FIGURE 6 (TYPICAL)

VAPOUR RECOVERY WITH TOP TIGHT FILL
CARGO TANK TOP LOADING

LEGEND:

100 mm = 4 in.

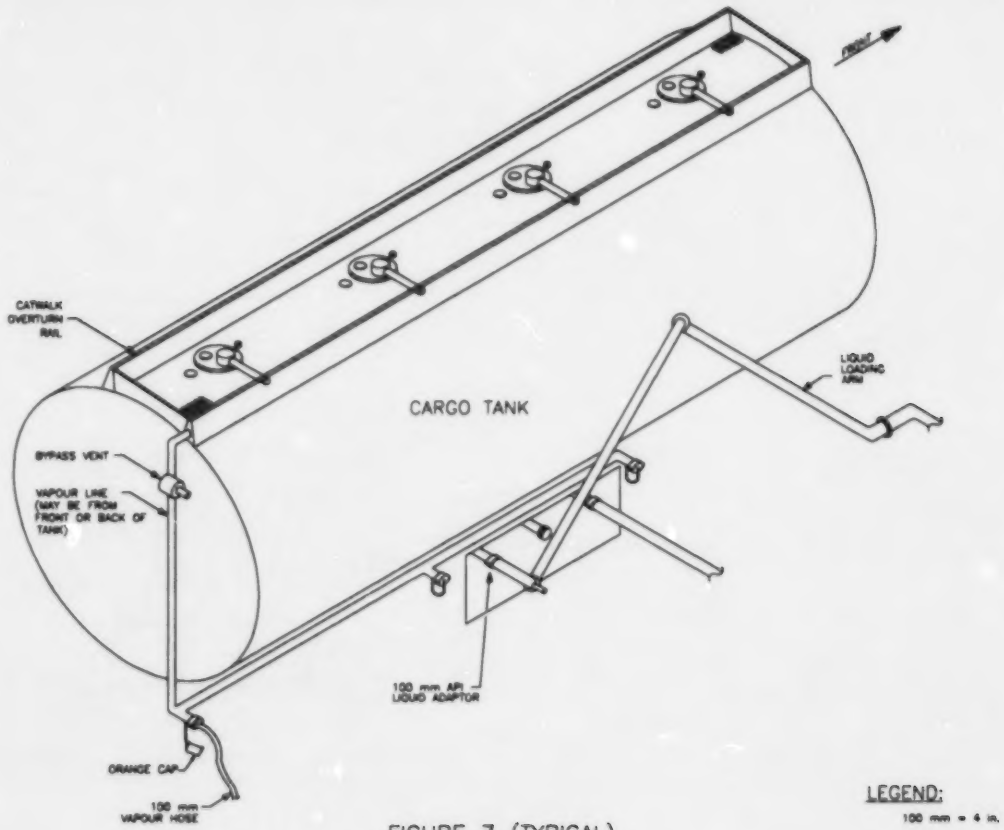


FIGURE 7 (TYPICAL)

CARGO TANK BOTTOM LOADING

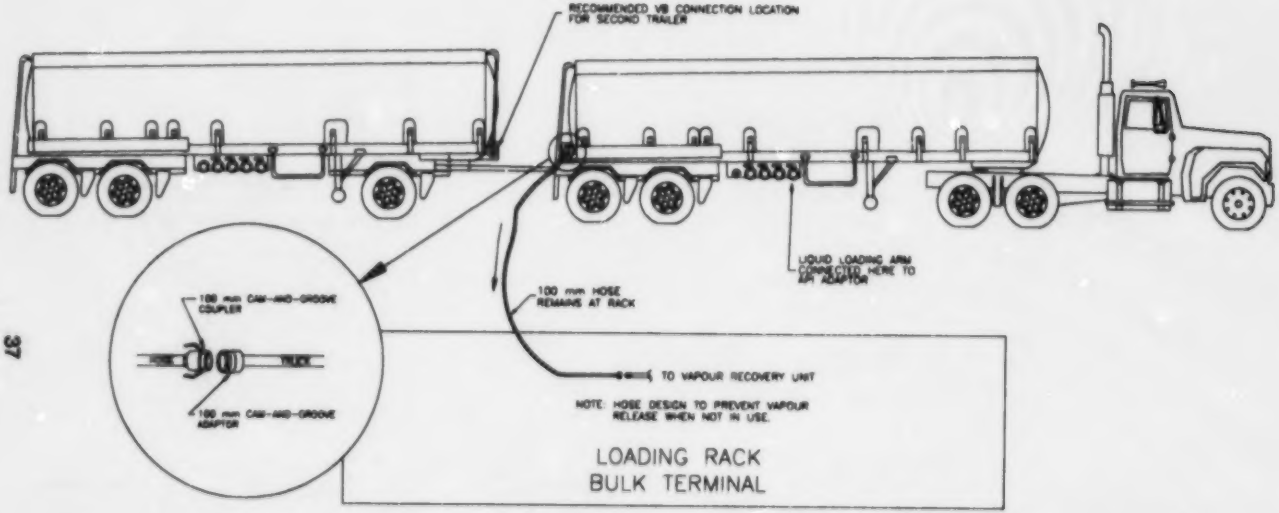

RECOMMENDED VB CONNECTION LOCATION FOR SECOND TRAILER
LIQUID LOADING ARM CONNECTED HERE TO API ADAPTOR
100 mm HOSE REMAINS AT RACK
100 mm CAM-AND-GROOVE COUPLER
HOSE
TRUCK
100 mm CAM-AND-GROOVE ADAPTOR
TO VAPOUR RECOVERY UNIT
NOTE: HOSE DESIGN TO PREVENT VAPOUR RELEASE WHEN NOT IN USE.
LOADING RACK
BULK TERMINAL

FIGURE 8 (TYPICAL)
TERMINAL VAPOUR CONTROL CONNECTIONS

LEGEND:
100 mm = 4 in.

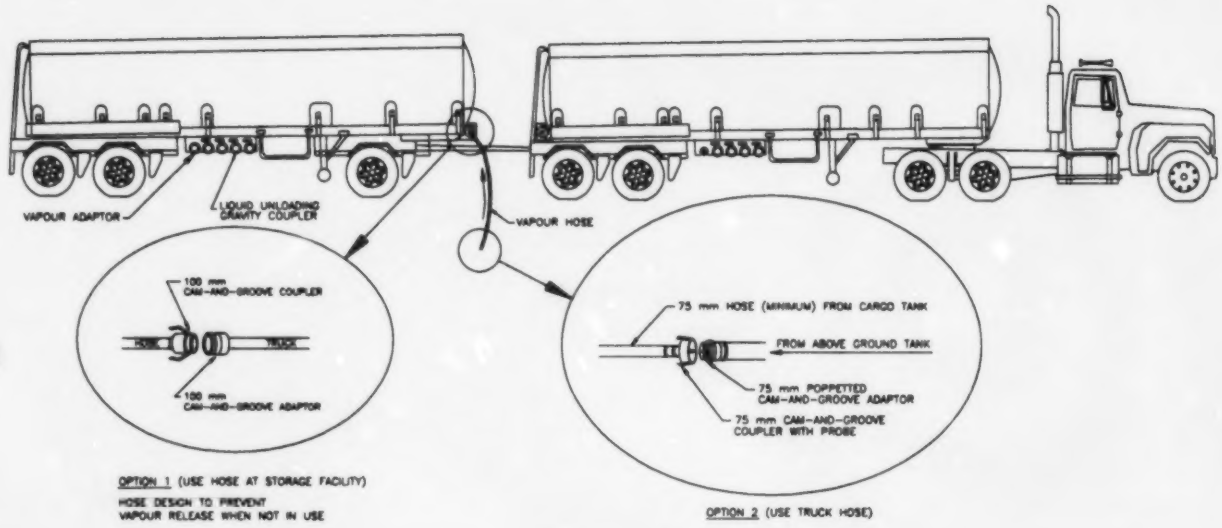

VAPOUR ADAPTOR
LIQUID UNLOADING GRAVITY COUPLER
VAPOUR HOSE
100 mm CAM-AND-GROOVE COUPLER
HOSE
TRUCK
100 mm CAM-AND-GROOVE ADAPTOR
OPTION 1 (USE HOSE AT STORAGE FACILITY)
HOSE DESIGN TO PREVENT VAPOUR RELEASE WHEN NOT IN USE
75 mm HOSE (MINIMUM) FROM CARGO TANK
FROM ABOVE GROUND TANK
75 mm POPPETTED CAM-AND-GROOVE ADAPTOR
75 mm CAM-AND-GROOVE COUPLER WITH PROBE
OPTION 2 (USE TRUCK HOSE)

FIGURE 9 (TYPICAL)
BULK PLANT VAPOUR CONTROL CONNECTIONS

LEGEND:
100 mm = 4 in.
75 mm = 3 in.

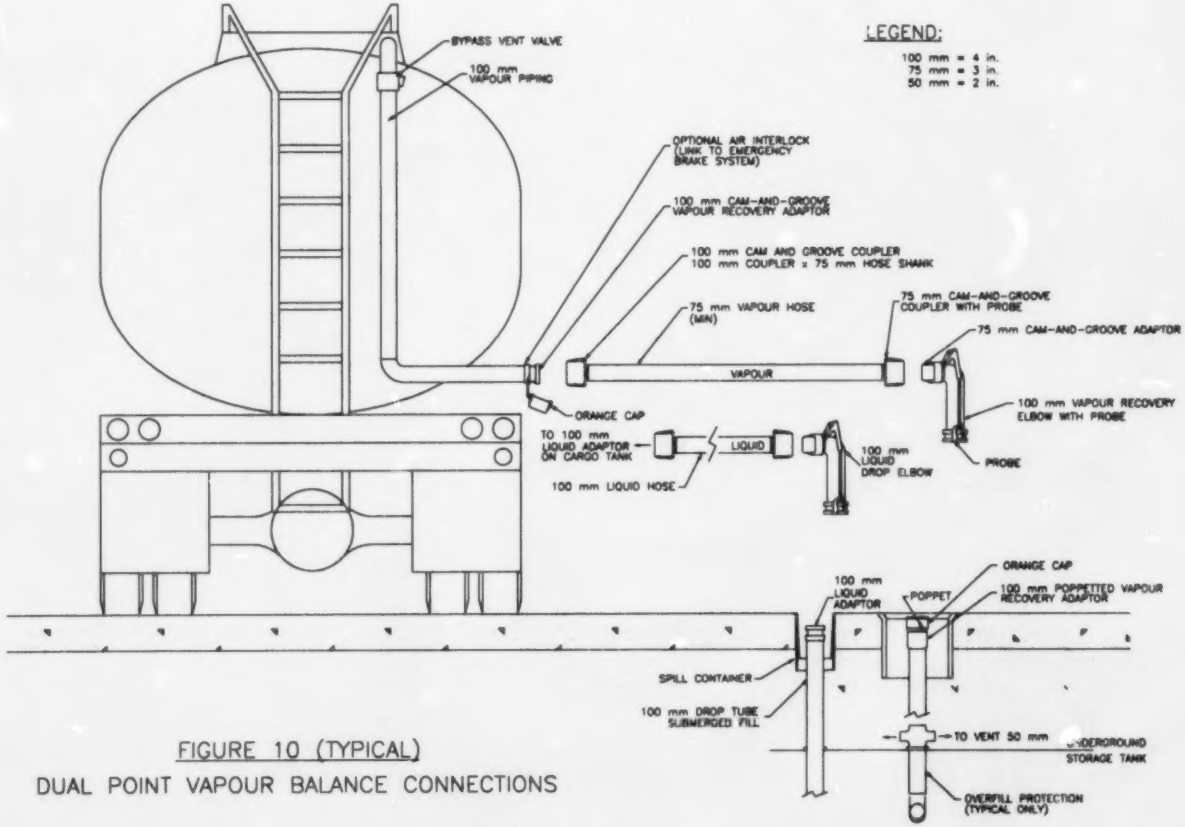

LEGEND:
100 mm = 4 in.
75 mm = 3 in.
50 mm = 2 in.
BYPASS VENT VALVE
100 mm VAPOUR PIPING
OPTIONAL AIR INTERLOCK (LINK TO EMERGENCY BRAKE SYSTEM)
100 mm CAM-AND-GROOVE VAPOUR RECOVERY ADAPTOR
100 mm CAM AND GROOVE COUPLER
100 mm COUPLER x 75 mm HOSE SHANK
75 mm VAPOUR HOSE (MIN)
75 mm CAM-AND-GROOVE COUPLER WITH PROBE
75 mm CAM-AND-GROOVE ADAPTOR
VAPOUR
100 mm VAPOUR RECOVERY ELBOW WITH PROBE
PROBE
ORANGE CAP
TO 100 mm LIQUID ADAPTOR ON CARGO TANK
LIQUID
100 mm LIQUID DROP ELBOW
100 mm LIQUID HOSE
100 mm LIQUID ADAPTOR
POPPET
ORANGE CAP
100 mm POPPETTED VAPOUR RECOVERY ADAPTOR
SPILL CONTAINER
100 mm DROP TUBE SUBMERGED FILL
TO VENT 50 mm
UNDERGROUND STORAGE TANK
OVERFILL PROTECTION (TYPICAL ONLY)

FIGURE 10 (TYPICAL)

DUAL POINT VAPOUR BALANCE CONNECTIONS

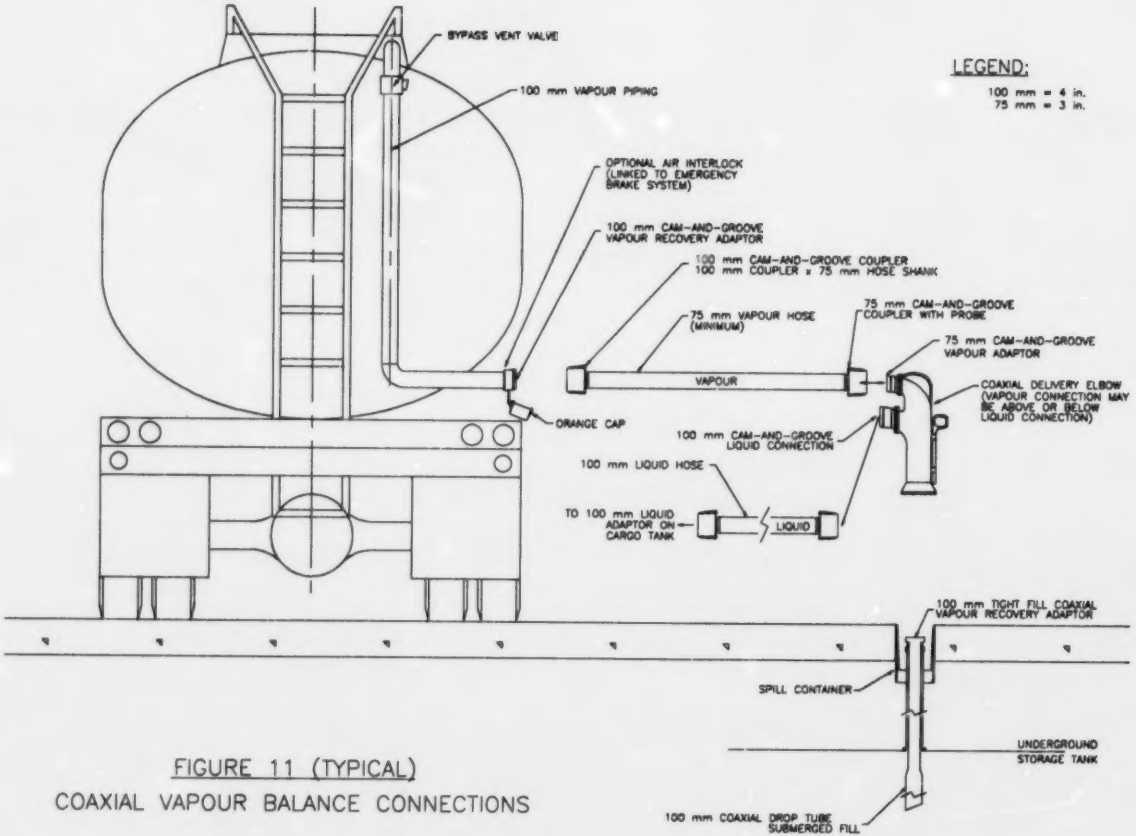
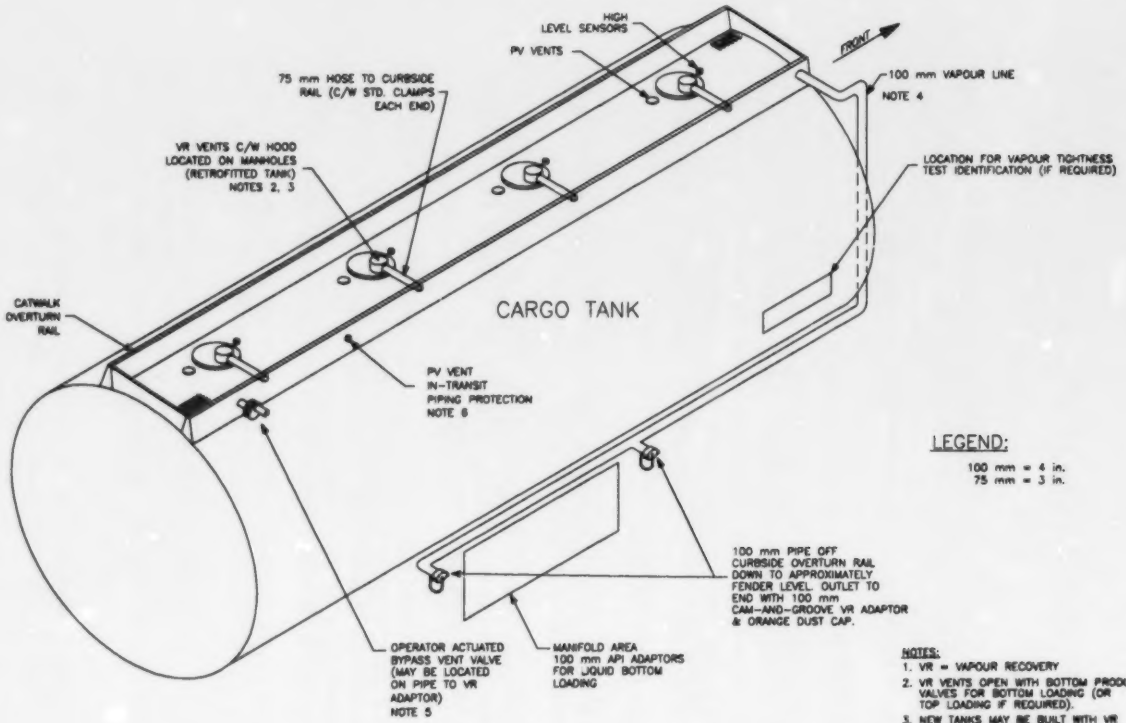

BYPASS VENT VALVE
100 mm VAPOUR PIPING
OPTIONAL AIR INTERLOCK (LINKED TO EMERGENCY BRAKE SYSTEM)
100 mm CAM-AND-GROOVE VAPOUR RECOVERY ADAPTOR
100 mm CAM-AND-GROOVE COUPLER
100 mm COUPLER x 75 mm HOSE SHANK
75 mm VAPOUR HOSE (MINIMUM)
75 mm CAM-AND-GROOVE COUPLER WITH PROBE
75 mm CAM-AND-GROOVE VAPOUR ADAPTOR
VAPOUR
COAXIAL DELIVERY ELBOW (VAPOUR CONNECTION MAY BE ABOVE OR BELOW LIQUID CONNECTION)
ORANGE CAP
100 mm CAM-AND-GROOVE LIQUID CONNECTION
100 mm LIQUID HOSE
TO 100 mm LIQUID ADAPTOR ON CARGO TANK
LIQUID
LEGEND:
100 mm = 4 in.
75 mm = 3 in.
100 mm TIGHT FILL COAXIAL VAPOUR RECOVERY ADAPTOR
SPILL CONTAINER
UNDERGROUND STORAGE TANK
100 mm COAXIAL DROP TUBE SUBMERGED FILL

FIGURE 11 (TYPICAL)

COAXIAL VAPOUR BALANCE CONNECTIONS


HIGH LEVEL SENSORS
PV VENTS
FRONT
75 mm HOSE TO CURBSIDE RAIL (C/W STD. CLAMPS EACH END)
100 mm VAPOUR LINE NOTE 4
VR VENTS C/W HOOD LOCATED ON MANHOLES (RETROFITTED TANK) NOTES 2, 3
LOCATION FOR VAPOUR TIGHTNESS TEST IDENTIFICATION (IF REQUIRED)
CATWALK OVERTURN RAIL
CARGO TANK
PV VENT IN-TRANSIT PIPING PROTECTION NOTE 6
LEGEND:
100 mm = 4 in.
75 mm = 3 in.
100 mm PIPE OFF CURBSIDE OVERTURN RAIL DOWN TO APPROXIMATELY FENDER LEVEL. OUTLET TO END WITH 100 mm CAM-AND-GROOVE VR ADAPTOR & ORANGE DUST CAP.
OPERATOR ACTUATED BYPASS VENT VALVE (MAY BE LOCATED ON PIPE TO VR ADAPTOR) NOTE 5
MANIFOLD AREA 100 mm API ADAPTORS FOR LIQUID BOTTOM LOADING

NOTES:

1. VR = VAPOUR RECOVERY
2. VR VENTS OPEN WITH BOTTOM PRODUCT VALVES FOR BOTTOM LOADING (OR TOP LOADING IF REQUIRED).
3. NEW TANKS MAY BE BUILT WITH VR VENT VALVES BESIDES THE MANHOLES.
4. VR PIPING FROM OVERTURN RAIL MAY BE FROM FRONT OR BACK OF TANK.
5. BYPASS VENT VALVE TO BE BELOW TOP OF RAILING AND LESS THAN 300 mm BELOW TOP (BOTTOM LOADING).
6. PV VENT MAY BE INSTALLED ON VAPOUR PIPING AS AN ALTERNATIVE.

FIGURE 12 (TYPICAL)

CARGO TANK VAPOUR CONTROL SYSTEM

Appendix C
Explanatory Notes

SHIPS AND BARGES

Ship and barge transfers are recognized as sources of VOC emissions. However, the technology to recover vapour from these operations is not fully developed. Vapour recovery in these facilities would not justify the cost of implementation. Consequently, action in this area of gasoline distribution systems has been deferred.

RAIL CAR TRANSFERS

Rail car transfers are recognized as sources of VOC emissions but do not amount to a significant contribution to the total Canadian VOC emissions. Volumes transferred by rail are less than one percent of total gasoline transferred. Implementation of vapour recovery in these facilities would be costly and would not justify the expense. Consequently, action in this area of gasoline distribution systems has been deferred.

AVIATION GASOLINE FACILITIES

The application of vapour recovery to aviation gasoline facilities has been deferred on the basis of low volume and potential hazards due to explosive vapour spaces.

a) The volume of aviation gasoline transferred in Canada is 0.5 percent of total gasoline marketed. The lower RVP of Aviation Gasoline also results in a low emission rate per volume transferred as compared to motor gasoline.

b) The vapour space in closed systems handling aviation gasoline may be in the explosive range at lower temperatures (around zero degrees Celsius). Connection/disconnection of piping in vapour recovery service could produce sparks which could initiate a fire or set off an explosion. A solution to this problem is required before the implementation of vapour controls for aviation gasoline transfers.

Appendix D
Provisions for Stage II Application Onboard Canisters vis Fueling Dispensers

Emissions of VOCs from gasoline during vehicle refueling can be further reduced by collecting the vapours at the nozzle (Stage II), or by the use of a vehicle onboard canister of sufficient size.

The two technologies developed are:

a) Stage II vapour controls; this is the collection of vapours from the vehicle fuel tank during refueling using a balance (or vacuum assisted) system that returns vapours to the service station underground tank. The equipment is part of the fueling nozzle at the dispenser.

b) Onboard systems which are part of the vehicle; they collect the vapours which are pushed through an adsorbent-filled canister during fueling. The vapours are drawn back into the engine and burned once the vehicle is in operation.

Many studies of these systems have been done in the United States by the US EPA and numerous consulting firms. The results are still being discussed.

The reader is referred to the following reports for further information on the Canadian government assessment of the technologies:

Control Technologies for Management of Nitrogen Oxides and Volatile Organic Compounds in Canada

1. Stage II - Work Sub-Group 6.3 Report - Large Stationary Sources

2. Onboard Controls - Work Sub-Group 6.1 Report - Mobile Sources

These reports may be obtained by contacting Environment Canada, Industrial Programs Branch, Oil, Gas, and Energy Division at 819-997-1220.

At this time, the proposed approach in Canada has been tabled in the NOx/VOC Management Plan. Stage II vapour control would be implemented in the LFV and WQC regions beginning May 1993, and any other regions where the authority having jurisdiction may decide to apply it.

In Canada, implementation of Stage II vapour controls in the LFV and WQC is expected to reduce the total anthropogenic VOC emissions by 2-3%.

Appendix E

SUMMARY OF CODE REQUIREMENTS

FACILITY	TYPE OF CONTROLS	SIZE	PERFORMANCE	SCHEDULE
	SF	All transfers		
	New and existing			
TERMINALS	VRU	>250 ML/y	35 mg/L (note 1)	New sites(LFV,WQC) 1992/05 Existing - LFV, WQC - 1993/05
	VCS	<250 50 ML/y	35 mg/L (note 1)	Provisions for VCS in
	New			new facilities for all Canada
	VCS (new terminal) (note 2)	>25 ML/y	35 mg/L (note 1)	1992/01
	SF	All transfers		
	Existing			
BULK PLANTS	VB (all transfers)	>20 ML/y	(note 1,3)	New sites (LFV,WQC) 1992/05 Existing - LFV, WQC - 1993/05
	VB (in only)	<20 4.5 ML/y	(note 1,3)	Provisions for VCS in
	New			new facilities for all Canada
	VB (all transfers) (note 5)	>4.5 ML/y	(note 1,3)	1992/01
	SF	All transfers		
SERVICE STATIONS	VCS Stage I (note 4)	>1.0 ML/y	(note 1)	New sites (LFV,WQC) 1992/05 Existing - LFV, WQC - 1993/05
	Records to be kept	<1.0 ML/y		Provisions for VB in new facilities for all Canada 1992/01
	SF	All transfers		
CARGO TANKS	VB	>21000 litre total capacity servicing VCS	Annual (4.5, - 1.5 kPa) Random leak test	As required to supply bulk plants and service stations with VB equipment in LFV, WQC
	New tanks	All		Provisions for VB in Canada 1992/01
MARINAS	Onshore - VB Offshore - same as barges	Service stations criteria		Same as service stations
RAIL CARS	SF (minimum)			*** DEFERRED ***
SHIPS and BARGES				
AVIATION GASOLINE				

ADDITIONAL REQUIREMENTS FOR SPECIFIED FACILITIES:

- Equipment standard - CAN/CGSB-3.1000-M
- Record keeping - throughput, downtime, pressure, leak test
- Compliance - inspection, standard requirements
- Training - owner, operator, inspector
- Operating practices - connecting, disconnecting, etc.

VB = Vapour balance VRU = vapour recovery unit VCS = Vapour control system SF = submerged fill
M = million L = litre y = year

Notes: 1. During test, visual inspection of equipment connections and leak test with combustible gas detector

2. An existing terminal expanded by 25 ML/y or more is considered as a new terminal.

3. Pressure test of piping during loading or unloading to verify maximum system pressure.

4. Existing service stations with yearly volume exceeding 1 ML, and supplied from bulk plants or terminals equipped with vapour controls on the cargo tank loading transfer.

5. An existing bulk plant expanded by 4.5 ML/y or more is considered as a new bulk plant.

NOTES FOR SUMMARY OF CODE REQUIREMENTS

1. TERMINALS

1.1 Suggested limits have been provided for cost-effectiveness of control systems. For larger facilities, larger investments can be supported. The cost of a VRU is roughly 8-10 times the cost of a VDU.

1.2 Approximately 95% of the total Canadian gasoline volume is transferred through terminals whose throughput exceeds the lower VCS limit of 50 ML/y; hence, the new VCS regulations will apply to 95% of the gasoline transferred in Canada. The 50 ML/y limit was chosen accordingly as a reasonable first goal of VOCs control in large facilities.

1.2.1 For new facilities, throughput limits have been established to match the US new source performance standard (NSPS).

1.2.3 For existing facilities which are expanded, an increase in throughput to a yearly volume greater than 50 ML or an incremental increase greater than 25 ML will require the installation of a VCS.

1.3 The stack emission limit of 35 mg hydrocarbons/litre of gasoline transferred is the same as the US limit. Going beyond that requires proportionally higher capital

investments, which escalate exponentially. The limit of 35 mg/L is equivalent to 97% recovery of normal gasoline vapour emissions to atmosphere at a terminal.

1.4 In areas where small terminals exist, analysis should be done in accordance with the considerations suggested in Part 2 of this Code.

1.5 The NOx/VOC Management Plan recommends that provisions be made in areas other than the LFV and WQC to facilitate future implementation of Stage I controls.

These provisions are left for the owners of facilities to determine. The intent of the requirement is that sufficient study and preparation be done with respect to new facilities to ensure the easy addition of a VCS when regulatory requirements are developed. For example, in the development of new terminal sites, adequate space should be allowed for the future addition of a VRU.

1.6 The performance of the VCS facilities at a terminal is to be evaluated using the test procedures laid out in the CAN/CGSB-3.1000-M Standard. It is understood that the authority having jurisdiction may have alternate or additional requirements.

1.7 All transfers should be done by means of submerged fill to minimize generation of gasoline vapours during transfer.

2. BULK PLANTS

2.1 It is recognized that capital investment for installation of VB could be significant at bulk plants. This would include loading arm modifications and the addition of piping for vapour recovery to each tank. To reduce the initial costs, VB on delivery(tank truck loading), has been proposed for existing facilities having a throughput of 20 ML/y or greater, while receipts will have a limit equal to US regulations.

2.1.1 To match the U.S. EPA NSPS standards, new bulk plants with annual throughput greater than 4.5 ML will require VB on all transfers.

2.1.2 For existing facilities which are expanded, an increase in throughput to a yearly volume greater than 20 ML will require VB on delivery to cargo tanks. An incremental increase greater than 4.5 ML will require the installation of VB on all transfers.

2.1.3 The high capital cost for retrofit of existing bulk plants is due to the safety requirements for cargo tank loading. At present, loading is done from the top, with the driver observing and manually controlling the fill rate to prevent overfill. With VB, some means other than the currently used overfill protection sensor is required to stop the flow in time. This could be done with a meter, as in terminals. However, the investment would make the control measure less cost-effective.

2.2 The performance of the bulk plant VCS should be evaluated using the recommended procedures of CAN/CGSB-3.1000-M.

2.3 Where the authority having jurisdiction decides to have a bulk plant checked for gasoline vapour emissions, a test similar to the terminal test would be performed, on the storage tank vent.

2.4 The NOx/VOC Management Plan recommends that provisions be made in areas other than the LFV and WQC to facilitate the future implementation of Stage I controls.

These provisions are left for the owners of facilities to determine. The intent of the requirement is that sufficient study and preparation be done with respect to *new* facilities to ensure the easy addition of a VCS when the regulatory requirement is developed. For example, adequate space for additional vapour recovery piping should be included in the design of a new bulk plant.

2.5 The performance of the VCS facilities at a bulk plant is to be evaluated using the test procedures laid out in the CAN/CGSB-3.1000-M Standard. It is understood that the authority having jurisdiction may have alternate or additional requirements.

2.6 All transfers should be done by means of submerged fill to minimize generation of gasoline vapours during transfer.

3. SERVICE STATIONS

3.1 The limit of 1.0 ML/year has been chosen on the basis that it will apply to at least 95% of the volume of gasoline transferred through service stations in high ozone areas.

3.1.1 Service stations which are supplied from bulk plants or terminals not equipped with VB shall be exempt from the requirements of this Code.

3.2 The performance of service station equipment can better be ensured through the use of proper equipment as recommended in CAN/CGSB-3.1000-M. Emission testing is cumbersome and costly, and the proper use of VCS equipment has proven effective in the United States as a means of controlling vapours during the transfer of gasoline to service station tanks.

3.3 For dual point vapour hookup, requirements for service stations would mean adding another connection to new underground tanks. The owner is left to decide whether or not to pre-invest.

3.4 All transfers should be done by means of submerged fill to minimize generation of gasoline vapours during transfer.

4. CARGO TANKS

4.1 Retrofitting of cargo tanks for vapour recovery is recommended for all those cargo tanks and or cargo tank assemblies (e.g., A-trains, B-trains) which have a total capacity greater than 21,000 litres and service VCS-equipped terminals and bulk plants in the LFV and WQC areas.

4.2 New cargo tanks built for gasoline bulk transport shall require provisions for VB equipment starting in 1992 to ensure that all gasoline transport in Canada is ultimately done by means of closed systems. The owner may decide to wait until the vapour controls are implemented before adding any equipment to the cargo tank.

4.3 Performance of cargo tanks shall be checked annually or at random using the leak tests specified in the CAN/CGSB-3.1000-M Standard.

4.4 All gasoline transfers to cargo tanks should be by means of submerged fill to minimize vapour generation.

APPENDIX F

VAPOUR CONTROL SYSTEMS (VCS) SAMPLE RECORD KEEPING FORM

| Date __/__/__
(y/ m/ d)

1. TYPE OF FACILITY: a) Terminal ____ b) Bulk Plant ____
c) Service Station ____ d) Cargo Tank ____

2. IDENTIFICATION: i) Owner _____ i) Operator _____

Address _____ Address _____

_____ _____

Province _____ Postal Code _____ Province _____ Postal Code _____

3. TYPE OF CONTROL EQUIPMENT:

a) TERMINAL i) VRU ____ ii) VDU ____ iii) None ____

b) BULK PLANT i) VRU ____ ii) VDU ____ iii) VB ____ iv) None ____

c) SERVICE STATION i) Coaxial _____ ii) Dual Point _____

d) CARGO TANK TYPE i-1) Top Loading ____ i-2) Bottom Loading _____
TEST ii-1) Annual _____ ii-2) Random _____

4. VOLUME THROUGHPUT:

Check one

(a) (b) (c) i) Yearly (litres): _____ ii) Monthly max (litres): _____

d) Cargo Tank Size (litres) _____

5. TEST TYPE IDENTIFICATION: CGSB No. _____ Other _____

6. TEST RESULTS:

(a) (b) Volume i) gasoline (litres): _____ ii) diesel (litres): _____

(a) Time duration: _____ hours

(a) (b) (c) Exit vent emissions (mg/l) _____

(a) (b) (c) (d) Visual Inspection _____

_____

(a) (b) (c) (d) Gas Tester Results _____

(a) (d) Pressure Test (kPa) _____ (d) Vacuum Test (- kPa) _____

7. CERTIFIED CORRECT: _____ Regulatory Agency _____

SAMPLE RECORD KEEPING FORM

EXPLANATORY NOTES

1. The intent is to have only one form to cover the four areas of vapour recovery in gasoline distribution networks. In this fashion, a consistent and uniform approach can be achieved. Consequently, it will be easier for both inspectors and owners to provide, review, and store required documentation.

2. It is preferred that the format allow the data to be gathered and inputted into a computer database for storage.

The reader is asked to note the entries identified as:

"a" for terminals
"b" for bulk plants
"c" for service stations
"d" for cargo tanks

This will ensure that even if the data were entered in the wrong slot further into the form, the reader of the data will be able to recognize the error and adjust.

3. Explanation of Entries

Item	Explanation
"Date"	Applicable for all inspections, tests, etc.
1	Check one to indicate type of facility inspected.
2	Identify the location of the facility, the owner, and the operator wherever applicable, for future followup.
3	Check one entry against the type of facility identified in Item 1. Bulk plants (b), depending on regulatory definition, could be equipped with a VRU or VDU. For cargo tanks (d), the test required could be the shop annual test with pressure and vacuum evaluation, or a random leak test associated with the testing of a terminal.
4	For terminals, bulk plants and service stations, volume must be recorded to enable classification or exemption. Size of the tank truck should be recorded for complete identification.

5 The type of test refers to the standard procedures as specified in CAN/CGSB-3.1000-M. These should be consulted when inspecting or checking facilities.

6 Test results are to be recorded as per CAN/CGSB-3.1000-M procedures.

Each entry is tagged with a letter to code the type of facility. The inspector is asked to circle a letter for each separate result entry.

For cargo tanks, the pressure test may be carried out either when the VRU/VDU test is being done (to establish system back pressure) or when the tank is undergoing its annual test (vapour tight).

Visual inspections should be done using the CAN/CGSB-3.1000-M Standard drawings to ensure proper equipment setup.

7 The form should be signed by the inspector witnessing the test to certify the integrity of the data.

Identification of the regulatory agency is required to register the source of the test result.